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THE ANIMAL KINGDOM

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ARRANGED IN CONFORMITY WITH ITS ORGANIZATION,

570

BY THE BARON CUVIER,

PERPETUAL SECRETARY TO THE ROYAL ACADEMY OF SCIENCES, ETC. ETC. ETC.

THE CRUSTACEA, ARACHNIDES AND INSECTA,

BY P. A. LATREILLE,

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TRANSLATED FROM THE FRENCH,

WITH NOTES AND ADDITIONS,

BY H. M'MURTRIE, M.D. &c. &c.

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THIRD GREAT DIVISION OF THE ANIMAL KINGDOM.

CRUSTACEA, ARACHNIDES, AND INSECTA:

OR ARTICULATED ANIMALS WITH ARTICULATED FEET.

INSECTA.

ORDER VI.

ORTHOPTERA(1).

In the Insects of this order, partly confounded by Linnæus with the Hemiptera, and reunited by Geoffroy to the Coleoptera, but as a particular division, we find the body generally less indurated than in the latter, and soft, semi-membranous elytra furnished with nervures, which, in the greater number, do not join at the suture in a straight line. Their wings are folded longitudinally, most frequently in the manner of a fan, and divided by membranous nervures running in the same direction. The maxillæ are always terminated by a dentated and horny piece covered with a *galea*, an appendage corresponding to the exterior division of the maxillæ of the Coleoptera. They have also a sort of tongue or epiglottis.

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(1) The *Ulonata*, Fab.

The Orthoptera(1) undergo a semi-metamorphosis, of which all the mutations are reduced to the growth and development of the elytra and wings, that are always visible in a rudimental state in the nymph. As both this nymph and the larva are otherwise exactly similar to the perfect Insect, they walk and feed in the same way.

The mouth of the Orthoptera consists of a labrum, two mandibles, as many maxillæ, and four palpi; those of the jaws always have five joints; whilst the labials, as in the Coleoptera, present but three. The mandibles are always very strong and corneous, and the ligula is constantly divided into two or four thongs. The form of the antennæ varies less than in the Coleoptera, but they are usually composed of a greater number of joints. Several, besides their reticulated eyes, have two or three small, simple ones. The inferior surface of the first joints of the tarsi is frequently fleshy or membranous(2). Many females are furnished with a true perforator formed of two blades, frequently enclosed in a common envelope, by means of which they deposit their eggs. The posterior extremity of the body, in most of them, is provided with appendages.

All Orthopterous Insects have a first membranous stomach or crop, followed by a muscular gizzard armed internally with corneous scales or teeth, according to the species; round the pylorus, except in the Forficulæ, are two or more cæca, furnished at the bottom with several small biliary vessels. Other vessels of the same description are inserted in the intestine near the middle.

The intestines of the larva are similar to those of the perfect Insect(3).

All the known Orthoptera, without exception, are terrestrial, even in their two first states of existence. Some are carnivorous or omnivorous, but the greater number feed on living plants. The species that belong to Europe produce but once a year; this takes place towards the end of the summer, which is also the period of their final transformation.

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(1) In this order and in those of the Lepidoptera, Hymenoptera, and Rhipiptera, as well as in the Apterous Hexapoda, there are no aquatic species.

(2) In the Acrydia, the under part of the first joint presents three pellets or divisions.

(3) M. Marcel de Serres, professor of Mineralogy at Montpellier, has made the

We will divide the Orthoptera into two great families(1).

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anatomy of these animals his special study. According to him the Orthoptera with setaceous antennæ, such as the Blattæ, Mantes, Gryllo-talpæ, Grylli, and Locustæ, have only elastic or tubular tracheæ, which are of two kinds, arterial and pulmonary. The latter alone distribute air throughout the body, after having received it from the former. In Orthoptera with cylindrical or prismatic antennæ, such as the Acrydia and Truxales, the pulmonary tracheæ are replaced by those that are vesicular. They are furnished with cartilaginous hoops or movable ribs, and receive air from tubular or elastic tracheæ proceeding from the arterial tracheæ. The nutritive system is more or less developed and presents four principal modifications. The Grylli and Gryllo-talpæ have the advantage in this respect over the others. The crop is utriculiform and placed sidewise, while in the others it is in the direction of the gizzard. Here the hepatic vessels are inserted separately: in the former, that insertion is effected through the medium of a common deferent canal. The Truxales and Acrydia, although approximated to the Locustæ by their digestive system, still differ from them in their superior hepatic vessels, the extremity of which is no longer furnished with secretory vessels, and which form cylindrical and elongated canals, but not widened sacs. The intestines of the Blattæ and Mantes present but two divisions; their nutritive system is otherwise the same. Whenever there is but a single testis, the female has but one ovary; this is the case in all those which have vesicular tracheæ. Those which only have elastic or tubular tracheæ, are furnished with two testes and two ovaries. The vesiculæ destined to lubricate the common spermatic canal are either double or single, according to the presence of one testis or two. The common oviduct of the females is also provided with a lubricating vesicle. The Forficulæ, on which he is silent, are removed from all other Insects of the same order, according to Baron Cuvier, by the absence of superior hepatic vessels. For the anatomy of these latter Insects we refer the reader to the Memoirs of MM. Posselt and Leon Dufour. With respect to the power of flight, it is evident that it is much greater in the Acrydia and Truxales, than in the other Orthoptera.

(1) Forming three sections in our Fam. Nat. du Règn. Anim. The first is divided into four families corresponding to the genera *Forficula*, *Blatta*, *Mantis*, and *Phasma*. The second comprises two families constituted by the genera *Acheta* and *Locusta*. The third section forms another family, having for its type the genera *Pneumora*, *Truxalis*, and that of *Gryllus*, Fab., or the *Acrydium*, Geoff. See also for further details on the Insects of this order, the Memoirs of the Academy of St Petersburg, 1812.

This division into two great families is confirmed by their anatomy, the Insects of the first having tubular tracheæ only, and those of the second such as are vesicular.

In those which compose the first, all the legs are similar, and only adapted for running,—they are the *Cursoria* or runners. In those which constitute the second, the posterior pair of thighs are much larger than the others, thereby enabling them to leap. Beside this, the males produce a sharp or stridulous noise—they are the *Saltatoria* or jumpers.

FAMILY I.

CURSORIA.

In this family the posterior legs, as well as the others, are solely adapted for running.

Almost all these Insects have their elytra and wings laid horizontally on the body; the females are destitute of a corneous ovipositor.

They form three genera: in the first or the

FORFICULA, Lin.

There are three joints in the tarsi; the wings are plaited like a fan, and folded transversely under very short and crustaceous elytra with a straight suture; the body is linear, with two large, squamous, mobile pieces, which form a forceps at its posterior extremity.

The head is exposed.

The antennæ are filiform, inserted before the eyes, and composed of from twelve to thirty joints, according to the species. The galea is slender, elongated, and almost cylindrical. The ligula is forked. The thorax in the form of a scale.

The researches of MM. Randohr, Posselt, Marcel de Serres, and those of M. Leon Dufour in particular, have unveiled to us the internal organization of these Insects. The latter gentleman has discovered two salivary glands, each consisting in a vesicle, more or less ellipsoidal, situated in the prothorax or thorax, terminated posteriorly by an extremely tenuous thread, and anteriorly by a tubular, capillary neck, which is slightly inflated near the pharynx, and then unites with the corresponding portion of the other gland to form a common trunk opening into the mouth.

The digestive canal consists of an esophagus, a large elongated crop, and of a short gizzard furnished internally for trituration, with six longitudinal and almost callous columns, in the form of lancets, separated by as many grooves, and with a valve at its ventricular aperture; of a stomach or chylific ventricle, at the posterior extremity of which are inserted numerous—thirty according to M. Dufour—hepatic vessels with a beak-like termination, a circumstance which removes these Insects from the Coleoptera, and approximates them to the other Orthoptera and to the Hymenoptera; and finally, of a small intestine, a cæcum and a rectum. The rectum, like that of several Hymenoptera, presents well circumscribed, muscular eminences, on which, by the aid of the microscope, we can discern highly ramified expansions of the tracheæ. According to M. Dufour, the apparatus of the genital organs differs essentially in various points from that of the Coleoptera and Orthoptera. Thus, for instance, the vesiculæ seminales, instead of being arranged symmetrically in pairs, consist of a single reservoir. Each testis is composed of two elongated, and more or less contiguous seminal capsules. The form of the ovaries, considered in mass, varies greatly, according to the species. Sometimes they resemble two clusters of grapes, and sometimes two bundles. In those females which have never been fecundated, the ovigerous sheaths have successive strangulations which give them the form of the beads of a rosary. We can pursue no further the observations of this savant, either in relation to the organs of respiration which consist in tubular tracheæ, or to the apparatus of sensation, or to the splanchnic adipose pulp. It has been said that the second joint of the tarsi was bilobate: he observes that it is simply dilated beneath, near the extremity, in the form of a reversed heart, and without emargination. He marks the two species submitted to his scalpel by detailed and rigorous characters(1).

These Insects are very common in cool and damp places, frequently collect in troops under stones and the bark of trees, are very injurious to our cultivated fruits, devour even their dead congeners, and defend themselves with their pincers, which frequently vary in form, according to the sex. It has been thought that they insinuate themselves into the ear, and to this they owe their name.

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(1). For other details, see his Memoir in the Ann. des Sc. Nat., XIII, 337. According to the same naturalist these Insects should form a particular order which he calls that of the *Labidoures*. M. Kirby had previously established it under the denomination of *Dermaptera*. Doctor Leach divides the remaining Orthoptera into two other orders. Those in which the wings are plaited and longitudinal, and where the suture of the elytra is straight form that of the Orthoptera proper. Those in which the elytra cross each other, the wings still remaining as usual, constitute that of the *Dictuoptera*.

F. auricularia, L.; De Geer, Mem. Insect., III, xxv, 16, 25. Length, half an inch; brown; head red; margin of the thorax greyish; legs an ochraceous yellow; fourteen joints in the antennæ.

The two sexes in coitu are united end to end. The female keeps careful watch over her eggs, and for some time over her young ones.

F. minor, L.; De Geer, Ib., pl. xxv, 26, 27. Two-thirds smaller than the auricularia; brown; head and thorax black; legs yellow; eleven joints in the antennæ. Found more particularly about dung-hills(1).

Blatta, Lin.

Where there are five joints to all the tarsi. The wings are only plaited longitudinally, the head is concealed under the plate of the thorax, and the body oval, orbicular and flattened.

Their antennæ are setaceous, inserted into an internal emargination of the eyes, long, and composed of a great many joints. The palpi are long, the thorax has the form of a shield. The elytra are usually of the length of the abdomen, coriaceous or semi-membranous, and slightly cross each other at the suture. The posterior extremity of the abdomen presents two conical and articulated appendages. The tibiæ are furnished with small spines. Their crop is longitudinal, and their gizzard is provided internally with strong, hooked teeth. They have eight or ten cæca round the pylorus.

The Blattæ are very active nocturnal Insects, some of which live in the interior of our houses, particularly the kitchen, in bake-houses and flour mills; the others inhabit the country. They are extremely voracious, and consume all sorts of provisions. The species peculiar to the French colonies are termed there *Kakerlacs* or *Kaker-*

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(1) Add *F. bipunctata*, Fab.; Panz., Faun. Insect. Germ., LXXXVIII, 10;—*F. gigantea*, Fab.; Herbst., Archiv. Insect., XLIX, 1; see Palis. de Beauv., Insect. d'Afr. et d'Amer. The two species quoted, and all those which have not more than fourteen joints in the antennæ, compose my genus Forficula proper—Faun. Nat. du Règn. Anim. Those which have more, such as the *F. gigantea* and others, form my genus Forficesila. All these Insects are winged. Those which are apterous form a third genus, that of Chelidoura. Doctor Leach also divides the Dermaptera into three genera: 1. *Forficula*, with fourteen joints in the antennæ; 2. *Labidoura*, with thirty; 3. *Labia*, with twelve. For further details respecting these Insects as well as for others of the same order, see the *Horæ Entomologicæ* of M. Toussaint Charpentier.

laques, and are a source of continued irritation to the inhabitants on account of the devastation they occasion. They not only devour our articles of food, but attack cloth, linen, silk and even shoes. They also eat Insects. Certain species of *Sphex* are constantly at war with them.

B. orientalis, L.; De Geer, Mem. Insect., III, xxv, i, 7. Length ten lines; reddish chesnut-brown; wings of the male shorter than the abdomen; those of the female mere rudiments. The eggs of the latter are enclosed symmetrically in an oval and compressed shell, first white, then brown, and serrated on one side. The Insect carries it for some time at the anus, and then fixes it by means of a gummy matter to various bodies. This species is a scourge to the inhabitants of Russia and Finland. It is said to be originally from Asia, and according to some authors from South America.

B. lapponica, L.; De Geer, Ib. 8, 9, 10. Blackish brown; margin of the thorax of a light grey; elytra of the same colour. It attacks the stock of dried fish which the Laplanders use instead of bread. In Europe it inhabits the woods.

B. americana, De Geer, Ib., xliv, 1, 2, 3. Reddish; thorax yellowish with two brown spots and a margin of the same colour; abdomen reddish; very long antennæ.—America.

M. Hummel, member of the Soc. Imp. Nat. Mosc., in the first number of his Entomological Essays, has given us various interesting observations on the history of the *B. germanica*, Fab., a species of a light reddish or fulvous colour, with two black lines on the thorax(1).

MANTIS, Lin.

Where we also find five joints in all the tarsi, and wings simply plaited longitudinally; but the head is exposed and the body narrow and elongated.

They also differ from the Blattæ in their short palpi terminating in a point, and in their quadrifid ligula.

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(1) For the other species, see De Geer, Ib.; Fab.; Oliv., Encyc. Méthod.; Fuels., Arch. Insect., tab. xlix, 2—11; Coqueb., Illust. Icon. Insect., III, xxi, 1; *B. pacifica*, and Touss. Charpent., Horæ Entomol., p. 71—78. As to the *Blatta acervorum* of Panzer, see the subgenus MYRMECOPHILA of the following family. Those Blattæ in which one of the sexes at least is destitute of wings, such as the *B. orientalis*, and the *B. limbata*, and *B. decipiens*, of Hummel, in our Faun. Nat. du Règ. Anim., form the genus KAKERLAC.

These Insects, which are only found in southern and temperate climates, remain on plants or trees, frequently resemble their leaves and branches in the form and colour of the body, and are diurnal. Some of them are rapacious and others herbivorous. Their eggs are usually enclosed in a capsule formed of some gummy substance which hardens by exposure to the air, and divided internally into several cells; it is sometimes in the form of an oval shell, and at others in that of a seed, with ridges and angles, and even bristled with little spines. The female glues it on a plant or other body raised above the earth. Their stomach resembles that of a Blatta, but their intestines are shorter in proportion(1).

In some, the two anterior legs are larger and longer than the others, the coxæ and thighs stout, compressed, armed with spines underneath, and the tibiæ terminated by a strong hook. They have three simple, distinct eyes, approximated into a triangle. The first segment of the trunk is very large, and the four lobes of the ligula are almost equal in length. The antennæ are inserted between the eyes, and the head is triangular and vertical.

These species are carnivorous, and seize their prey with their fore legs, which they raise upwards or extend forwards, flexing the tibia with great quickness on the under part of the thigh. Their eggs, which are numerous, are enclosed in a corresponding number of cells, arranged in regular series, and united in an ovoid mass.

They form the subgenus

Mantis proper.

Those in which the front is prolonged into a sort of horn, and in which the antennæ of the male are pectinated, are the Empusæ of Illiger. The extremity of their thighs is furnished with a rounded membranous appendage resembling a ruffle. The margin of the abdomen is festooned in several(2).

Those which have no horn on the head, and in which the antennæ are simple in both sexes, alone compose the genus Mantis of the same naturalist(3).

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(1) Excellent anatomical observations on these Insects are given by M. Marcel de Serres in the Mem. du Mus. d'Hist. Naturelle.

(2) Stoll., Mant., viii, 30; ix, 34, 35; x, 40; xi, 44; xii, 47, 48, 50; xvi, 58, 59; xvii, 61; xx, 74; xxi, 79. The fig. 94, of pl. xxiv, is a larva very similar to that of the *Mantis pauverata* of Fabricius.

(3) Generis hujus speciei Americanæ septentrionalis coitus spectaculum singulare sæpe exhibet, *femina maris corpus in actu devorans.* Rem ita esse amicus meus verax probavit. *Am. Ed.*

M. religiosa, L.; Rœs., Insect. II, Gryll., I, II. So called from the position to which it raises its anterior legs or arms, which resembles that of supplication. The Turks entertain a religious respect for this animal, and another species is held in still greater veneration by the Hottentots.

The *M. religiosa*, very common in the southern parts of France and in Italy, is two inches long, of a light green colour, sometimes brown and immaculate, the inner side of the anterior coxæ excepted, where we observe a yellow spot margined with black, a character which distinguishes it from an almost similar species from the Cape of Good Hope(1).

In the others, the anterior legs resemble the following ones. The eyes are simple, very indistinct, or null; and the first segment of the trunk is shorter, or at most as long as the following one. The interior divisions of the ligula are shorter than the others. The antennæ are inserted before the eyes, and the head is almost ovoid, projects, and has thick mandibles and compressed palpi.

These Insects have singular forms resembling twigs of trees or leaves. They appear to feed exclusively on vegetables, and like several Grylli are coloured like the plants on which they live. There is frequently a great difference between the sexes.

They form the subgenus

Spectrum, Stoll,

Which has been again divided into two others(2).

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(1) For the other species, see Stoll, genus *Mantis*, or the *Walking leaves*, those excepted which are referable to the genus *Phyllium*. See also the Monog. Mant. of Lichtenst., Lin. Trans., VI; Palisot de Beauv., Insect. d'Afr. et d'Amer.; Herbst., Arch. Insect., and Charpent., Hor. Entom., p. 87—91.

(2) MM. Lepeletier and Serville—Encyc. Méthod.—have added some new genera to those indicated by me in my Fam. Nat. du Règne Animal. In some, the prothorax is much shorter than the mesothorax; the body and legs are long and linear. The elytra, when there are any, are very short in both sexes. Those which are apterous form two genera: Bacillus, where the antennæ are very short, granose, and subulate; and Bacteria, where they are much longer than the head, and setaceous. The second division comprehends species furnished with wings and elytra at least in one of the sexes. Here we find no simple eyes: such are the genera Cladoxerus, where the legs are equally remote, and Cyphocrana, where the four last are more approximated. There (Phasma) we observe simple eyes.

In the others, the body is more or less oval or oblong and flattened, but not linear. The legs are short or but slightly elongated and foliaceous. The length of the prothorax equals at least half that of the mesothorax. The abdomen is rhomboidal and in the form of a spatula. There are no simple eyes, and the fe-

Those species in which the body is filiform or linear, resembling a stick, are the

PHASMA, Fab.

Several are altogether apterous, or have but very short elytra.

Very large ones are found in the Moluccas and South America. The south of France produces the

Ph. Rossia, Fab.; Ross., Faun. Etrusc., II, viii, 1. Both sexes apterous; yellowish green or cinereous brown; antennæ very short, granose, and conical; legs ridged; a tooth near the extremity of the thighs(1).

Those in which the body, as well as the legs, is much flattened and membranous, compose the genus

PHYLLIUM, Illig.

Such for instance is the celebrated

P. siccifolium; Mantis siccifolia, Lin. Fab.; Stoll, Spect., VIII, 24—26. Extremely flat; pale green, or yellowish; thorax short, with a dentated margin; dentated leaflets on the thighs. The female is furnished with very short antennæ and elytra as long as the abdomen, but is destitute of wings. The male is narrower and more elongated, with long setaceous antennæ, short elytra, and wings the length of the abdomen.

This species is bred by the inhabitants of the Sechelles as an object of commerce.

The male of another species is figured by Stoll, Mantes, pl. xxiii, 89.

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males at least are furnished with elytra. This division comprises two genera: PRISOPUS, where the prothorax is shorter than the mesothorax, and where both sexes are provided with elytra and wings that cover the greater part of their abdomen; and PHYLLIUM, where the prothorax is almost as long as the mesothorax; the females are destitute of wings and have very short antennæ, while the males have long ones and are winged, but with very short elytra. These individuals having the prothorax very long, in a natural order we should reverse the series, and begin with Phyllium.

(1) For the other species, see the figure of Stoll, genus *Spectrum;* Lichtenst., Monog. Mant.; Lin. Trans., VI, genus *Phasma;* Lin. Trans., XIV; Palis. de Beauv. Insect. d'Afr. et d'Amer. See also Charpent., Hor. Entom., p. 93, 94. The two species of Phasma, described by the latter—*rossium* and *gallicum*—belong to the genus *Bacillus*, already mentioned.

FAMILY II.

SALTATORIA.

The posterior legs of the Insects which compose our second family of the Orthoptera, are remarkable for the largeness of their thighs, and for their spinous tibiæ, which are adapted for saltation.

The males summon their mates by a stridulous noise, vulgarly termed singing. This is sometimes produced by rapidly rubbing against its antagonist an interior and more membranous portion of each elytron which resembles a piece of talc. It is sometimes excited by a similar motion of their posterior thighs upon the elytra and wings, acting like the bow of a violin.

The greater number of the females deposit their eggs in the earth.

This family is composed of the genus

GRYLLUS, Lin.

Which we will divide thus:

In some species where the musical instrument of the males consists of an interior portion of their elytra resembling a mirror or head of a drum, and where the females frequently have an extremely salient ovipositor, in the form of a stylet or sabre, we find antennæ either more slender and minute at the extremity, or of equal thickness throughout, but very short and almost resembling a chaplet. The elytra and wings, in those few which have less than four joints to all the tarsi, are laid horizontally on the body. The ligula is always quadripartite, the two middle divisions being very small. The labrum is entire.

Sometimes the elytra and wings are horizontal; the wings, when at rest, form a kind of fillet or thong extended beyond the elytra, and the tarsi have but three joints, as in the genus

GRYLLUS, Geoff. Oliv.—*Acheta,* (*Gryllus acheta,* Lin.) Fab.

They conceal themselves in holes, and usually feed on Insects. Several of them are nocturnal. Their crop frequently forms a lateral pouch. Their pylorus has but two thick cæca. Their biliary vessels are inserted into the intestine by a common trunk.

They form four subgenera.

GRYLLO-TALPA, Lat.

Where the tibiæ and tarsi of the two anterior legs are wide, flat and dentated, resembling hands or are adapted for digging. The other tarsi are of the ordinary form, and terminated by two hooks; the antennæ are more slender at the end, elongated and multiarticulated.

G. vulgaris; Gryllus gryllo-talpa, L.; Rœs., Insect., II, Gryll., xiv, xv. Length one inch and a half; brown above, reddish-yellow beneath; anterior tibiæ with four teeth; wings double the length of the elytra. This species is but too well known by the mischief it effects in gardens and cultivated grounds. It lives in the earth, where its two anterior legs, which act like a saw and shovel, or like those of a Mole, open a passage for it. It cuts and separates the roots of plants, but not so much for the purpose of eating them as to clear its road, for it feeds, as it appears, on Worms and Insects. The cry of the male, which is only heard at night, is soft and agreeable.

In June and July, the female digs a rounded, smooth, subterranean cavity, about six inches in depth, in which she deposits from two to four hundred eggs; this nest, with the gallery that leads to it, resembles a bottle with a curved neck. The young remain together for some time. For other details, see the observations of M. Le Feburier, Nouv. Cours d'Agriculture(1).

TRIDACTYLUS, Oliv.—*Xya*, Illig.

These Insects also excavate the earth, but with the anterior legs only; in lieu of posterior tarsi, they are furnished with movable, narrow, hooked appendages, resembling fingers. The antennæ are of equal thickness, very short, and consist of ten rounded joints.

T. variegatus; Xya variegata, Illig.; Charpent., Hor. Entom., II, p. 84, f. 2, 5. Very small; black, with numerous spots or dots of a yellowish-white; a great jumper. South of France, on the shores of rivers(2).

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(1) Lat., Gener. Crust. et Insect., III, p. 95.

(2) Lat., Ib., p. 96, *T. paradoxus*, Coqueb., Illust. Icon. Insect., III, xxi, 3.

GRYLLUS proper,

Where none of the legs are adapted for digging, and where the posterior extremity of the female abdomen is provided with a salient ovipositor.

Their antennæ are always elongated, smaller near the extremity and terminate in a point. The simple eyes are less distinct than in the Tridactyli and Gryllo-talpæ.

G. campestris, L.; Rœs., Insect., II, Gryll., xiii. Black; base of the elytra yellowish; head large; posterior thighs red beneath. It excavates deep holes by the roadside, in dry soils, and in situations exposed to the sun, where it remains in ambush, watching for the Insects on which it preys. There also the female lays her eggs, which amount to three hundred. This species hunts the following one.

G. domesticus, L.; Rœs., Insect., II, Gryll., xii. Pale-yellowish mixed with brown. It frequents those parts of houses in which fires are generally kept, and which furnish it with both shelter and food, as behind chimneys, ovens, &c. Such are also its breeding places. The male produces a shrill and disagreeable noise.

Spain and Barbary produce a very singular Gryllus, the *G. umbraculatus*, L. The forehead of the male is furnished with a membranous prolongation, which falls like a veil.

Messrs. Lefèvre and Bibron have brought from Sicily a new and large species, described by the former under the name of *megacephalus;* its stridulous noise is prolonged for half a minute and may be heard at the distance of a mile.

The wings of the *G. monstrosus* form several spiral convolutions at the extremity(1).

MYRMECOPHILA.—*Sphærium*, Charp.

The Myrmecophilæ have no wings; and the body is oval. With respect to their antennæ and the absence of simple eyes, they resemble the true Grylli. The posterior thighs are extremely large.

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(1) Add *Gryllus pellucens*, Panz., Faun. Insect. Germ., XXII, 17, male of the *Acheta italica*, Fab. It lives on flowers;—*Acheta sylvestris*, Fab.; Coqueb., Illust. Icon., I, i, 2;—*A. umbraculata*, Fab.; Coqueb., Ib., III, xxi, 2, and other species figured by De Geer, Drury, Herbst., &c. See Fabricius.

The only species known—*Blatta acervorum*, Panz. Faun. Insect. Germ., LXVIII, 24—lives in ant-hills(1).

Sometimes the elytra and wings are tectiform, and the tarsi are quadriarticulated. The antennæ are always very long and setaceous. The mandibles are less dentated, and the galea is wider than in the Grylli. The females always have a projecting ovipositor, compressed, and in the form of a sabre.

They have but two cæca, like the preceding Insects, but the biliary vessels surround the middle of the intestine, and are inserted directly into it.

These Orthoptera are herbivorous and form the genus

Locusta, Geoff. Fab.—*Gryllus tettigonia,* Lin.

Such for instance are the

L. viridissima, Fab.; Rœs., Insect., II., Gryll., x, xi. Two inches long; green and immaculate; ovipositor of the female straight.

L. verrucivora, Fab.; Rœs., Ib., VIII. An inch and a half long; brown; elytra spotted with brown or blackish; ovipositor of the female recurved. It bites with considerable severity, and it is said that the Swedish peasants are in the habit of making it bite the warts on their hands, and that in consequence of those excrescences receiving into the wound the black and bilious fluid poured into it by the Insect, they become desiccated and disappear.

Several species of this genus are apterous, or have but very short elytra. Such is the

L. ephippiger, Fab., Ross., Faun. Etrusc., II, viii, 3, 4(2).

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(1) It is the subject, if I mistake not, of a Memoir from the pen of M. Paul Savi.

(2) This species, and some others, in which both sexes are almost apterous, or present at most but very short elytra resembling rounded and arched scales, form the genus Ephippiger of my Fam. Nat. du. Règn. Anim. That of Anisoptera is composed of species the males of which are winged, and the females apterous or merely furnished with very short elytra; such are the *L. dorsalis, brachyptera,* of M. Toussaint Charpentier. The species provided with ordinary elytra and wings, in which the antennæ are simple, and the front is not elevated pyramidically, form the genus Gryllus proper. Such are the first two species above described. Add to them the *Locusta varia,* Fab.; Panz., Ib., XXXIII, 1;—*L. fusca,* Ib., ii;—*L. clypeata,* Ib., iv;—*L. denticulata,* Ib., v. His *Gryllus proboscideus,* Ib., XXII, 18, is the *Panorpa hiemalis.*

See also De Geer, Herbstein, Donovan and Stoll, *Santeralle à sabre,* pl. i—xii; Lat., Gener. Crust. et Insect., III, p. 100.

Those species in which the males produce their stridulation only by rubbing their thighs against the elytra or wings, and whose females are destitute of a salient ovipositor, are distinguished from the preceding ones by their antennæ, which are sometimes filiform and cylindrical, and sometimes ensiform or clavate, and always at least as long as the head and thorax; their elytra and wings are always tectiform or inclined, and their tarsi are triarticulated. They have five or six cæca, and their biliary vessels, as in most of the order, are directly inserted into the intestine.

The ligula of the greater number is merely bipartite. They all have three distinct simple eyes, the labrum emarginated, the mandibles multidentated, and the abdomen conical and compressed laterally. They leap better than the preceding ones, fly higher and longer, and feed voraciously on vegetables. They may be comprised in one single genus, that of

ACRYDIUM, Geoff.

Which may be subdivided as follows:

Some have the mouth exposed, the ligula bifid, and a membranous pellet between the terminal hooks of the tarsi. Such are

PNEUMORA, Thunb.—partim *Gryllus bulla*, Lin.

Distinguished from the following by the posterior legs, which are shorter than the body, and less adapted for leaping, and by their vesicular abdomen, at least in one of the sexes.

Their antennæ are filiform.

They are only found in the most southern part of Africa(1).

PROSCOPIA, Klüg.

Apterous Insects, with a long and cylindrical body; their head,

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Those Grylli in which the front is elevated in the manner of a pyramid or cone have been generically distinguished by Thunberg under the name of CONOCEPHALUS. Finally, the SCAPHURÆ of M. Kirby—Lin. Trans.; Encyclop. Méthod.—or my *Pennicornes*, resemble ordinary Grylli, but their antennæ are bearded inferiorly, and their oviduct is scaphoid.

For other genera, see Toussaint Charpentier, and the Mem. of the Imper. Acad. of St Petersburg, where Thunberg has established new generic sections.

(1) *Pneumora sexguttata*, Thunb., Act. Suec., 1775, vii, 3; *Gryllus inanis*, Fab.;—*P. immaculata*, Thunb., Ib., vii, 1;—*G. papillosus*, Fab.;—*P. maculata*, Thunb., Ib., vii, 2;—*G. variolosus*, Fab.

destitute of ocelli, is prolonged anteriorly in the manner of a cone or point, bearing two filiform antennæ, shorter than itself, and composed of seven joints at most, the last pointed. Their posterior legs are large, long, and approximated to the intermediaries, which are more than usually remote from the anterior ones. These Orthoptera, peculiar to South America, form the subject of an excellent Monograph, published by M. Klüg.

TRUXALIS, Fab.—*Gryllus acrida,* Lin.

The Truxales, by their compressed, prismatic, ensiform antennæ, and by their pyramidally raised head, are removed from all other Orthoptera(1).

Some species of the following subgenus, such as the *Gryllus carinatus* of Linnæus, and the *G. gallinaceus* of Fabricius, are intermediate, by their antennæ, between Truxalis and Acrydium proper, and form the genus XIPHICERA, Lat.—*Pamphagus,* Thunb.

ACRYDIUM proper.—GRYLLUS, Fab.—*Gryllus locusta,* and some *G. bulla,* Lin.

The true Acrydia differ from the Pneumoræ in their posterior legs which are longer than the body, and in their solid, non-vesicular abdomen, and from the Truxales in their ovoid head, and their antennæ, which are filiform or terminated by a button(2).

They fly by starts, and to a considerable height.

The wings are frequently very prettily coloured, particularly with red and blue, as observed in several species that inhabit France. The thorax, in some of those that are foreign to Europe, frequently exhibits crests and large warts, in a word, a singular variety of forms.

Certain species, called by travellers *Migratory Locusts*(3), sometimes unite in incalculable numbers and emigrate, resembling in their passage through the air, a thick and heavy cloud; wherever they alight all signs of vegetation quickly disappear, and a desert is speedily created. Their death frequently forms another scourge, as the air becomes poisoned by the frightful mass of their decomposing bodies.

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(1) *Gryllus nasutus,* L.; Rœs., Insect., II, Gryll. iv, 1, 2. The antennæ are false; Herbst., Ib., vii, 7, the male; 6, the female; Stoll, viii, b, 27—Drury, Insects, II, xl, 1.

(2) In many species, on each side, and near the origin of the abdomen, is a large cavity, closed internally by a very thin membranous diaphragm, coloured like nacre. I have described this organ (Mémoires du Muséum d'Histoire Naturelle, VIII) which must necessarily have some influence on the stridulous noise of these Insects, as well as on their flight. I have compared it to a sort of drum.

(3) The general reader must not allow himself to be deceived by names. This Insect is what we commonly call a *Grashopper.* The *Locust,* so called in this country, is a totally different Insect, and belongs to another order. See *Hemiptera,* genus *Cicada* or *Tettigonia. Am. Ed.*

M. Miot, in his excellent translation of Herodotus, has given it as his opinion, that the heaps of bodies of winged Serpents which that historian states he saw in Egypt, were nothing more than masses of this species of Acrydium. In this I perfectly agree with him.

These Insects are eaten in various parts of Africa, where the inhabitants collect them for their own use and for commerce. They take away their elytra and wings and preserve them in brine.

A considerable part of Europe is frequently devastated by the

A. migratorius; Gryllus migratorius, L.; Rœs.; Insect. II, Gryll., xxiv. Length two inches and a half; usually green, with obscure spots; elytra light brown spotted with black; a low crest on the thorax. The eggs are enveloped in a frothy and glutinous flesh-coloured matter, forming a cocoon, which the Insect is said to glue to some plant. Common in Poland.

The south of Europe, Barbary, Egypt, &c., are frequently devastated in like manner by other species, some of which are rather larger—*G. ægyptius*, *tartaricus*, L.,—which differ but little from the *Gryllus lineolus* of Fabricius, found in the south of France—Herbst., Archiv. Insect., LIV, 2,—a species proper to the same countries, and which is the one that is prepared and eaten in Barbary, as above described. The natives of Senegal dry another, the body of which is yellow, spotted with black; they then, as I have been told by M. Savigny, reduce it to powder, and employ it as flour. It is figured by Shaw and Denon. These two species and several others have a conical projection of the præsternum, and compose my genus Acrydium, properly so called. Of those which do not present this character but have likewise filiform antennæ, some are furnished with wings and elytra in both sexes. They belong to the genus which I have named Œdipoda.

Of this number are the two following Acrydia of authors,

Gryllus stridulus, L.; Rœs., Ib., XXI, 1, 23. Deep brown or blackish; thorax raised into a carina; wings red, with the extremity black.

Gryllus cærulescens, L.; Rœs., Ib. XXI, 4. Wings blue, somewhat tinged with green, and marked with a black band(1).

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(1) Add *G. biguttulus*, Panz., Ib., XXXIII, 6;—*G. grossus*, Ib. 7;—*G. pedestris*,

In other Acrydia, also winged and with filiform antennæ, the superior portion of the thorax is very elevated, strongly compressed, and forms an acute crest rounded and prolonged posteriorly. Certain species foreign to Europe are very large. The south of Europe produces one that is smaller, the *Acrydium armatum*, Fisch., Entomog. Imp. Russ., I, Orthop., I, 1.

In the others, *G. pedester*—*Giornæ*, Charpent.—one at least of the two sexes has elytra and very short wings, not at all adapted for flight. They form my new genus Podisma.

Those Acrydia in which the extremity of the antennæ is inflated in the form of a button, either in one sex or both, constitute the genus Gomphocerus, Thunb. Such is the

> *A. sibiricus; G. sibiricus*, Fab.; Panz., Faun. Insect. Germ., XXIII, 20. Anterior tibiæ of the males strongly inflated and clavate. Found in Siberia and St Gothard.

In the second division of the genus of the Acrydia the præsternum receives a portion of the under part of the head into a cavity; the ligula is quadrifid; the tarsi have no pellet between their hooks.

The antennæ are composed of but thirteen or fourteen joints. The thorax is prolonged posteriorly in the form of a large scutellum, sometimes longer than the body, and the elytra are very small. These Orthoptera form the genus

Tetrix, Lat.—*Acrydium*(1), Fab.—partim *Gryllus-bulla*, Lin.

It consists of very small species.

Ib., 8;—*G. lineatus*, Ib., 9; and see De Geer,—*Santerelles de passage*, pl. i—xiii, with the exception of the figures quoted under *Truxalis*;—Olivier—article *Criquet* of the Encyc. Méthod.; and the other authors quoted by Fabricius, under his genus *Gryllus*, such as Schæffer, Herbst., Drury, Rœs., &c. See also Lat., Gen. Crust. et Insect., III, p. 104. These references, however, are only applicable to the genus *Acrydium* as originally established, or with the subtraction of those here indicated, and which may be considered simple divisions.

(1) *Acrydium subulatum*, Fab.; De Geer; Schæff., Icon. Insect., cliv, 9, 10, clxi, 2, 3;—*A. bipunctatum*, Panz., Ib. V, 18, var.;—*A. scutellatum*, De Geer, M. Insect., III, xxiii, 15. See also Herbst., Archiv. Insect., lii, 1—5.

ORDER VII.

HEMIPTERA(1).

The Hemiptera, according to our system, terminate the numerous division of Insects which are provided with elytra, and of all those, are the only ones which have neither mandibles nor maxillæ properly so called. A tubular, articulated, cylindrical, or conical appendage curved inferiorly, or directed along the pectus, having the appearance of a kind of rostrum, presents along its superior surface, when raised, a groove or canal from which may be protruded three rigid, scaly, extremely fine, and pointed setæ, covered at base by a ligula. These setæ, when united, form a sucker resembling a sting, sheathed in the tubular apparatus we have just described, where it is kept in situ by the superior ligula placed at its base. The inferior seta consists of two filaments which are united into one at a little distance from their origin, so that in reality the sucker is composed of four pieces. The inference drawn from this by M. Savigny, is, that the two superior setæ, or those which are separate, represent the mandibles of the triturating Insects, and that the two filaments of the inferior seta correspond to their maxillæ(2); this once admitted, the labium is replaced by the sheath of the sucker, and the triangular piece at the base becomes a labium. A true ligula also exists, and under a form analogous to that of the preceding piece but bifid at the extremity. The palpi are the only parts which have totally disappeared: vestiges of them, however, may be perceived in *Thrips*.

The mouth of Hemipterous Insects is then only adapted for extracting fluids by suction; the attenuated stylets of which the sucker is formed, pierce the vessels of plants and animals, and the nutritious fluid being successively compressed is forced into the internal canal, and thus arrives at the esophagus. The sheath of this apparatus is at these times frequently bent into an angle, or becomes geniculate. These Insects, like other Suctoria, are furnished with salivary vessels(1).

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(1) *Ryngota*, Fab.

(2) Or rather, in my opinion, to their terminal lobe, or that superior portion which in the Bees and Lepidoptera is prolonged into a thread or attenuated lamina, and reaches beyond the insertion of the palpi.

In most of the Insects which compose this order, the elytra are coriaceous or crustaceous, the posterior extremity being membranous and forming a sort of an appendage to them; they almost always decussate; those of the other Hemiptera are simply thicker and larger than the wings, semi-membranous, like the elytra of the Orthoptera, and sometimes opaque and coloured, sometimes transparent and veined. There are a few longitudinal plicæ in the wings.

The composition of the trunk begins to experience modifications which approximate it to that of the Insects of the following orders. Its first segment, hitherto designated by the name of thorax, has, in several, much less extent, and is incorporated with the second, which is equally exposed.

Several have simple eyes, of which, however, there are frequently but two.

The Hemiptera exhibit the same forms and habits in their three states. The only change they experience consists in the development and growth of the volume of the body. They usually have a stomach with firm and muscular parietes, a small intestine, followed by a large one divided into several inflations, and biliary vessels, few in number, and inserted at a distance from the pylorus.

I divide this order into two sections(2).

In the first, that of the HETEROPTERA, Lat., the rostrum

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(1) See in particular the anatomical observations of M. Leon Dufour, on the Cicadæ and Nepæ.

(2) In the systems of Messrs Kirby and Leach, they form two orders. Our *Heteroptera* are there termed *Hemiptera*, and our section of the *Homoptera* forms the second under the same name.

arises from the front; the elytra are membranous at the extremity, and the first segment of the trunk, much larger than the others, alone forms the thorax.

The elytra and wings are always horizontal or slightly inclined.

This section is composed of two families.

FAMILY I.

GEOCORISÆ.

In this family the antennæ are exposed, longer than the head, and inserted between the eyes, near their internal margin. There are three joints in the tarsi, the first of which is sometimes very short.

It forms the genus

CIMEX, Lin.

In some, or the *Longilabra*, the sheath of the sucker consists of four exposed and distinct joints, the labrum is much prolonged beyond the head, subulate, and striated superiorly.

The tarsi always consist of three distinct joints, the first of which is almost as long as the second or longer. These species always diffuse a disagreeable odour, and suck the juices of various Insects.

Sometimes their antennæ, always filiform, are composed of five joints; the body is generally short, oval or rounded.

SCUTELLERA, Lam.—*Tetyra*, Fab.

Where the scutellum covers the whole abdomen.

S. lineata; Cimex lineatus, L.; Wolf, Cimic., I, ii, 2. Length four lines; red, longitudinally striped with black above; black points arranged in lines on the venter. Environs of Paris and south of Europe, on flowers, the Umbelliferæ, particularly(1).

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(1) For the other species, see Fabricius, Syst. Rynkot., genus *Tetyra*. According to Dalman—Ephem. Entom., I—his genus *Canopus* differs from the preceding one in the following characters: the body more inflated, slightly compressed, con-

PENTATOMA, Oliv.

Where the scutellum covers but a portion of the superior part of the abdomen. This genus of Olivier forms five in the system of the *Ryngota* of Fabricius; they are, however, as imperfectly characterized, as they are badly arranged. His *Ælia*, and *Halys*, are Pentatomæ with a head more prolonged and projecting in the manner of a snout, and more or less triangular. Among the species which he refers to the first, that which he calls the *acuminata*, and which is the *Punaise à tête alongée* of Geoffroy, appears to be essentially removed from the Pentatomæ by the antennæ, which are covered at base by the anterior margin of the thorax and separated from it underneath, and by its much larger scutellum, which approximates this Insect to the Scutelleræ. In his *Cydnus*, the head, viewed from above, is wide and semicircular; the thorax forms a transversal square, hardly narrower before than behind, and the tibiæ are frequently spinous. These species remain on the ground. Of this number is the *Punaise noire* of Geoffroy. We might also approximate to them, as has already been done by Messrs Lepeletier and Serville—Encyc. Méthod.—certain species in which the sternum is neither carinated nor armed with a spine. Such are the two following:

P. ornata; Cimex ornatus, L.; Wolf, Cimic., II, 16. Length four lines and a half; figure of a rounded ovoid; red, multimaculate; head and wings black.—On the Cabbage and other Cruciferæ.

P. oleracea; Cimex oleraceus, L.; Wolf, Ib., II, 16. Length three lines; ovoid; bluish-green with a thoracic line, a dot on the scutellum and one on each elytron, white or red.

Other Pentatomæ in which the poststernum or mesosternum is raised into a carina, or presents a spiniform point, would be distinguished by the generic appellation of EDESSA, employed by Fabricius. Several of the species which he includes in that genus present this character. It is also visible in several of those which belong to his *Cimex*, such as the two following Pentatomæ:

P. hæmorrhoidalis; *Cimex hæmorrhoidalis*, L.; Wolf., Ib., I, 10. Length seven lines; ovoid; green above, yellowish beneath; posterior angles of the thorax extended into an obtuse point; a large brown spot on the elytra; back of the abdomen red, spotted with black.

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cave beneath, with the margin of the scutellum pendent over the sides; no simple eyes; legs unarmed.

The female of the *P. grisea—Cimex griseus*, L.—protects and leads her young ones just as a hen does her chickens(1).

We have thought it requisite to establish a new generic section, HETEROSOELIS, for a Pentatoma peculiar to Cayenne, in which the head is cylindrical and the anterior tibiæ form a semi-oval pallette.

Sometimes the antennæ have but four joints, and the body is generally oblong.

Here the antennæ are filiform or clavate.

Certain species foreign to Europe approach the preceding in the general form of their body, which is rather ovoid than oblong, and are distinguished from all the following ones, either because it is much flattened, membranous, and with a strongly dilated, slashed and angular margin, or because their thorax is prolonged posteriorly in the manner of a truncated lobe, and their sternum is horned—these latter form the subgenus

TESSERATOMA,

Established by MM. Lepeletier and Serville—Encyc. Méthod.—with the *Edessa papillosa* of Fabricius, and his *E. amethystina.*

Some other Edessæ of the same naturalist—the *obscura, mactans, viduata*—resembling ordinary Pentatomæ, without any posterior thoracic prolongation, but with quadriarticulated antennæ, might also form another subgenus—DINIDOR.

A species from Brazil, analogous by its flattened form to the Aradus of that naturalist, in which the edges of the body are dilated, slashed and angular, and its anterior extremity forms a sort of clypeus truncated before, cleft in the middle, unidentated on each side behind, and concealing antennæ, geniculate near their middle, and seemingly formed of but three joints because the first is very short, is the type of the subgenus

PHLÆA, Lepel. and Serv.(2)

All the following Geocorisæ are generally oblong, besides which they present none of the other characters peculiar to the preceding subgenera.

Here the antennæ are inserted near the lateral and superior borders of the head, above an imaginary line drawn from the middle of the eyes to the origin of the labrum. The simple eyes are either approximated or separated by an interval about equal to that which is between each of them and the neighbouring eye.

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(1) See Fabricius, genera ut sup.

(2) Encyc. Méthod.

Next come those in which the body is more or less oblong, without being filiform or linear.

COREUS, Fab.

Where the body is partly oval, the last joint of the antennæ ovoid or fusiform, frequently thicker than the preceding one, and usually shorter, and of equal length at most, in the others.

* They could be separated into several sections, which might even be considered as subgenera, according to the relative proportions and forms of the joints of their antennæ(1).

> *C. marginatus; Cimex marginatus*, L.; Wolf. Cimic., I, iii, 20. Length six lines, and of a cinnamon-red; second and third joint of the antennæ russet, the two others blackish; the two first longest of all; a small tooth at the internal base of the first; posterior sides of the thorax raised and rounded; abdomen dilated and turned up on the sides, with the middle of its superior surface red. On plants; it diffuses a strong odour which resembles that of an apple.

The antennæ of the other Geocorisæ of the same subdivision terminate by an elongated, cylindrical, or filiform joint. They constitute a great portion of the genus LYGÆUS of Fabricius, and comprise besides that which he calls ALYDUS. The posterior legs of the males are most frequently remarkable for the thickness of the thighs, and in a great number for the form of their tibiæ, which are sometimes compressed and have the edges dilated, as if membranous and winged, or foliaceous, and sometimes curved. Most of them are foreign to Europe.

To these Lygæi must be referred those species in which the simple eyes are separated from each other by an interval about equal to that which exists between each eye and its neighbour, and in which the thorax is much wider posteriorly than before, or forms a triangle with a truncated apex. The body is generally less narrow than in the opposite division, or that which is composed of the Alydi.

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(1) GONOCERUS. The last joint of the antennæ shorter than the preceding one, and ovoid or oval; the latter and the second compressed, angular or dilated; the first, or at least the second, longest of all. The *C. sulcicornis, insidiator, antennator*, of Fabricius.

SYROMASTES. The last joint of the antennæ shorter than the preceding one, and bordering on an oval; the latter, filiform and simple. The *C. marginatus, scapha, spiniger, paradoxus, quadratus*, Fab., and his *Lygæus sanctus*.

COREUS. The last joint of the antennæ differing but little in length from the preceding one, and almost fusiform; the latter not compressed. The *C. dentator, hirticornis, clavicornis, acrydioides, capitatus*, Fab.

HOLHYMENIA, Lepel. and Serv.

Where the second and third joints of the antennæ are shaped like a palette(1).

PACHYLIS, Lepel. and Serv.

Where the third only has that form(2).

ANISOSCELI, Lat.

Where the antennæ are filiform and not dilated(3).

Certain Geocorisæ of the same division, with a narrow and elongated body, projecting eyes, the ocelli approximated, and the thorax merely a little narrower before than behind, and almost trapezoidal, form the subgenus

ALYDUS, Fab.(4)

Now come Geocorisæ with a very narrow, long, filiform, or linear body. The antennæ and legs are also proportionally smaller.

LEPTOCORISA, Lat.

Where the antennæ are straight(5).

NEIDES, Lat.—*Berytus*, Fab.

Where those organs are geniculate(6).

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(1) Encyc. Méthod., Insect., X, p. 61. Add *Lygæus biclavatus*, Fab.

(2) Encyc. Méthod., Ib. p. 62.

(3) Some have the posterior tibiæ edged with a membrane: the *L. membranaceus*, *compressipes*, *phyllopus*, *gonagra*, *foliaceus*, *dilatatus*, *tragus*, &c. Fab.

The others are destitute of that membrane; the *L. vulgus*, *grossipes*, *tenebrosus*, *fulvicornis*, *curvipes*, *profanus*, *phasianus*, *bellicosus*, &c. Fab.

Some species, with smaller antennæ, and of the length of the body, form the subgenus NEMATOPUS of my Fam. Nat. du Règ. Animal.

(4) See the Syst. Ryngator., Fab., p. 248.

(5) The *Gerris* of Fabricius, with the exception of the *vagabundus*.

(6) See Lat., Gener. Crust. et Insect., III, p. 126; and Oliv., Encyclop. Méthodique.

We now pass to Geocorisæ in which the antennæ, also filiform or thicker at the extremity and quadriarticulated, are inserted lower than the preceding ones, either on an imaginary line, drawn from the eyes to the origin of the labrum, or beneath it. The ocelli are approximated to the eyes, and the membranous appendages of the elytra frequently present but four or five nervures.

Here the head is not narrowed posteriorly in the manner of a neck.

Lygæus, Fab.

Where the head is narrower than the thorax, and where the latter is narrowed anteriorly and is trapezoidal.

L. equestris; Cimex equestris, L.; Wolf, Cimic., I, iii, 24. Length five lines; red, with black spots; membranous portion of the elytra brown spotted with white.

L. apterus; Cimex apterus, L.; Stoll., Cimic., II, xv, 103. Length four lines; apterous; red; the head, a spot on the middle of the thorax and large dot on each elytron, black; extremity of the elytra truncated or without a membranous appendage. Very common in our gardens. It is sometimes, though very rarely, found with wings.

Those species, in which the anterior thighs are inflated, form the genus Pachymera of MM. Lepeletier and Serville, a name already employed, and which must be changed(1).

Salda, Fab.

Where the head, taken in its greatest breadth, is as wide as the thorax or wider, and has its posterior angles dilated, with large eyes, and where the thorax is always of equal width and square(2).

There, the head is ovoid and narrowed posteriorly in the manner of a neck.

Myodocha, Lat.(3)

We have now arrived at *Longilabra*, in which the antennæ, composed of four joints, become gradually thinner towards the extremity, and frequently even abruptly so, or are setaceous.

In our Fam. Nat. du Règ. Anim., we have formed the subgenus

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(1) See Fab., and Lat., Gener. Crust. et Insect., III, p. 121.

(2) The Saldæ, *atra, albipennis, grylloides*, Fab.

(3) See Lat., Gener., &c., and Encyc. Méthodique.

Astemma,

With certain species in which the antennæ are gradually setaceous and where the second joint is of equal thickness and almost glabrous. The thorax is hardly narrower before than behind, and forms a transversal square, or is cylindrical; the head is as if incised perpendicularly or rounded at its origin(1).

Miris, Fab.

Similar to Astemma in the antennæ, but removed from it by the thorax, which is much wider posteriorly than before, and trapezoidal(2).

Capsus, Fab.

A similar and trapezoidal thorax, but the second joint of the antennæ is attenuated at base, and densely pilose, particularly towards the extremity, otherwise almost cylindrical and slender like the first(3).

Heterotoma, Lat.

The Heterotomæ are very distinct from the preceding Insects by the size and width of the two first joints of the antennæ, and of the second particularly, which forms an elongated palette; the two last are very short(4).

In the remaining Hemiptera of this family there are but two or three apparent joints(5) in the sheath of the sucker; the labrum is short and without striæ. The first joint of the tarsi, and frequently even the second, is very short in the greater number.

Sometimes the legs are inserted in the middle of the pectus; they terminate by two distinct hooks which originate from the middle of the extremity of the tarsus; they can neither be used as oars, nor for running on the water.

We then separate those species in which the rostrum is always straight, sheathed at base or throughout its length; where the eyes are of an ordinary size, and where the head at its junction with the thorax exhibits no appearance of an abrupt neck or strangulation.

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(1) The Saldæ *pallicornis*, *flavipes*, Fab., and some other species, but in which the body is much narrower and longer, and somewhat more analogous in the head to the Myodochæ.

(2) Fab., Syst. Ryng.; Lat., Ib. p. 124.

(3) Fab., Syst. Ryng.; Lat. Gener., Crust. et Insect., III, p. 123.

(4) *Capsus spissicornis*, Fab.

(5) Four in the Reduvii, but the first is very short, almost null.

Their body is usually altogether, or in part, membranous, and most commonly much flattened(1). They compose the greater part of the primitive genus

ACANTHIA, Fab.

Which that author afterwards divided as follows:

SYRTIS, Fab.—*Macrocephalus*, Swed. Lat.—*Phymata*, Lat.

Where the anterior legs resemble the monodactyle claw of the Crustacea, and are used by these Insects to seize their prey(2).

TINGIS, Fab.

Where the body is very flat, and the termination of the antennæ globuliform; the third joint is much longer than the others.

Most of the species live on plants, piercing their leaves or flowers, and sometimes producing false gall-nuts. The leaves of Pear trees are frequently riddled by one of this genus, the *T. pyri*, Fab.(3)

ARADUS, Fab.

Similar to Tingis, in the form of the body, but with cylindrical antennæ, of which the second joint is almost as large as the third, or is even longer.

They are found under the bark of trees, in the cracks of old wood, &c.(4)

CIMEX, Lat.—*Acanthia*, Fab.

In Cimex proper the body is very flat, but the antennæ terminate abruptly in the form of a seta. We know but too well the

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(1) These Insects, in our Fam. Nat. du Règ. Anim., form the second tribe of the Geocorisæ, that which I have there designated by the term *membraneuse*.

(2) Fab., Syst. Ryngot. In *Microcephalus—S. manicata*, Fab.—the antennæ, terminated by a very large joint, are not lodged in inferior cavities of the margin of the thorax; the scutellum is distinct, and covers a large part of the abdomen. In *Phymata*, the antennæ are received into peculiar cavities under the lateral edges of the thorax, which is prolonged into a scutellum, and only covers a portion of the abdomen. See Lat.; Gen. Crust. et Insect., III, p. 137, 138.

(3) Fab., Ib.; Lat., Gener. Crust. et Insect.

(4) Fab., Ib.; Lat., Ib.

C. lectularius, L.; Wolf, Cimic., IV, xii, 121. It is pretended that this Insect, vulgarly termed the *bed-bug*, did not exist in England previous to the fire of London in 1666, and that it was transported thither in timber from America. With respect to the continent of Europe, however, we find that it is mentioned by Dioscorides. It has also been asserted that this species sometimes acquires wings. It likewise harasses young pigeons, swallows, &c.; but that which lives on these latter birds appears to me to be a different species.

Various means of destroying these noxious Insects have been proposed; extreme vigilance, and great cleanliness however are the best.

The remaining Geocorisæ of this subdivision(1) have the rostrum exposed, arcuated, or sometime straight; but their labrum is salient and their head abruptly strangulated behind or narrowed into a neck. Certain species have remarkably large eyes.

Those which do not present this character, and have their head supported by a neck, form the primitive genus

REDUVIUS, Fab.

Their rostrum is short but sharp, and can inflict a severe puncture, the painful effects of which are sensible for some time. Their antennæ are extremely slender near the end, or setaceous(2). Several of the species make a noise similar to that which proceeds from the Crioceres, Cerambyci, &c., but which is produced with more rapidity.

This genus has been thus divided:

HOLOPTILUS, Lepel. and Serv.

Where the antennæ have but three joints, the two last of which are furnished with long hairs, arranged in two rows, and verticillated on the last(3).

In the other species the antennæ consist of four joints at least, and are glabrous, or simply pubescent.

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(1) The *Nudicolles*, Fam. Nat. du Règn. Anim.

(2) The first joint is frequently united to the second, and the latter to the third, by a very small joint or rotula.

(3) Encyc. Méthod., Insect., X, p. 280.

REDUVIUS, Fab.

Or Reduvii properly so called. The body is an oblong oval, and the legs of a moderate length.

We may unite with them the *Nabis*, Lat.(1) and the *Petalocheires* of Palis. de Beauvois; the anterior tibiæ of the latter are clypeiform.

R. personatus; *Cimex personatus*, L.; *Punaise mouche*, Geoff., I, ix, 3. Length eight lines; blackish-brown and immaculate. It inhabits the interior of houses, where it lives on flies and other insects, approaching its prey slowly till within a certain distance, and then darting upon it. Its stings kill it in an instant. The larva and nymph resemble a spider covered with dust and dirt(2).

ZELUS, Fab.

Where the body is linear, and the legs very long, extremely slender, and alike(3).

PLOIARIA, Scop.—*Emesa*, Fab.

Analogous to the preceding Insects in the linear form of the body, and the length and tenuity of the legs; but the two anterior ones have elongated coxæ, and are adapted, as in Mantis, for seizing their prey(4).

We now come to Geocorisæ, remarkable for their large eyes, and which have no apparent neck, but whose transversal head is separated from the thorax by a strangulation.

They live on the shores of ponds, &c. where they run with great swiftness, and frequently make little leaps.

Some have a short and arcuated rostrum, and setaceous antennæ. They form the

LEPTOPUS, Lat.(5)

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(1) The thorax in Nabis is not (or but very slightly) divided by that impressed and transverse line which we observe in Reduvius. Here, besides, the simple eyes are situated on an eminence or division of the posterior part of the head. This latter genus is susceptible of being separated into several subgenera.

(2) Fab., Syst. Ryng.; Lat., Gener. Crust. et Insect., III, p. 128. See particularly the Encyc. Méthod., article *Reduve*.

(3) Fab., Syst. Ryngot.; Lat. Ib., p. 129.

(4) Fab., Ib.; *Gerris vagabundus*, ejusd.; Lat., Ib.

(5) Lat., Consid. sur l'Ord. Nat. des Crust. et des Insect., p. 259.

In the others the rostrum is long and straight, the labrum projects from its sheath, and the antennæ are filiform or a little larger near the extremity. The simple eyes are situated on a tubercle. They are çonsidered by Fabricius as Saldæ.

Latreille separates them into two divisions. His Acanthiæ—or part of the Saldæ, Fab.(1)—have salient antennæ, at least equal in length to half that of the body. Their form is oval. The simple eyes are closely approximated and sessile. In his Pelogonus(2) the antennæ are much shorter and bent under the eyes. The body is shorter and more rounded, and there is a tolerably large scutellum. The simple eyes are remote. These Hemiptera approach the *Naucores*, and with the following appear to lead to them.

Sometimes the four posterior legs, very slender and extremely long, are inserted on the sides of the pectus, and are very remote from each other at base; the tarsial hooks are very small, but little distinct, and situated in a fissure of the lateral extremity of the tarsus(3). These legs are adapted for swimming or walking on water, and are peculiar to the genus

Hydrometra, Fab.(4)

Which Latreille divides into three subgenera.

Hydrometra, Lat.

Or Hydrometra properly so called, where the antennæ are setaceous, and the head is prolonged into a long snout, receiving the rostrum in a groove underneath(5).

Gerris, Lat.

Where the antennæ are filiform, the sheath of the sucker is triarticulated, and the second pair of legs are very remote from the first, and at least double the length of the body(6).

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(1) Fab., Ib. The Saldæ *zosteræ, striata, littoralis*; Lat., Ib.

(2) Lat., Consid. sur l'Ord. Nat. des Crust. et des Insect., III, p. 142; Germ. Faun. Insect. Europ., XI, 23.

(3) The prothorax is extended above the mesothorax, in the form of an elongated plate, narrowed and terminated in a point, representing the scutellum, under which the elytra originate. The mesothorax is greatly elongated.

(4) Fab., Syst. Ryngot.

(5) Lat., Gener. Crust. et Insect., III, p. 131.

(6) Lat. Ib.

The two anterior legs, as well as in the following subgenus, act as pincers.

Velia, Lat.

Where the antennæ are also filiform, but the sheath of the sucker has but two apparent joints, and the legs, much shorter, are inserted at nearly equal distances from each other(1).

FAMILY II.

HYDROCORISÆ.

In our second family of the Hemiptera, the antennæ are inserted and concealed under the eyes; they are shorter than the head, or hardly as long.

All these Insects are aquatic, carnivorous, and seize others with their anterior legs, which flex on themselves and act as pincers. They sting severely.

Their tarsi present but one or two joints. Their eyes are in general remarkably large.

Some—*Nepides*—have the two anterior legs in the form of pincers, composed of a thigh, either very thick or very long, with a groove underneath for the reception of the inferior edge of the tibia and of a very short tarsus; or one that is even confounded with the tibia, and forming with it a large hook.

The body is oval and much depressed in some, and linear in others. They form the genus

Nepa, Lin.

Or that of the Aquatic Scorpions, as they are commonly called, which is thus divided:

Galgulus, Lat.

Where all the tarsi are similar, cylindrical, and composed of two very distinct joints, the last with two terminal hooks. The antennæ appear to consist of but three joints, the last of which is the largest and ovoid(1).

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(1) Lat., Gener. Crust. et Insect., III, p. 131.

The antennæ of the following genera are quadriarticulated, and the anterior tarsi terminate simply in a point or hook.

Naucoris, Geoff. Fab.

The labrum in Naucoris is not emarginated, as is the case in the following genus, but is exposed, large, triangular, and covers the base of the rostrum. The body is almost ovoid and depressed, and the head rounded; the eyes are very flat. The antennæ are simple and without any projection in the form of a tooth. There is no salient appendage at the posterior extremity of the abdomen. The four last legs are ciliated, and their tarsi consist of two joints, with two hooks at the end of the last.

N. cimicoides; Nepa cimicoides, L.; Rœs., Insect., III, Cim. Aquat., xxxviii. Five or six lines long, and of a greenish brown, lighter on the head and thorax; margin of the abdomen serrated and projecting beyond the elytra(2).

In the three following subgenera, the labrum is sheathed, and the extremity of the abdomen presents two filaments.

Belostoma, Lat.

Where all the tarsi are biarticulated, and the antennæ are semi-pectinated(3).

Nepa, Lat.

Or Nepa proper, where the anterior tarsi have but one joint, and the four posterior ones two, and where the antennæ appear forked. The rostrum is curved beneath; the coxæ of the two anterior legs are short, and their thighs much wider than their other parts.

Their body is narrower and more elongated than in the preceding subgenera, and almost elliptical. Their abdomen is terminated by two setæ which enable them to respire in the oozy and aquatic localities at the bottom of which they live. Their eggs resemble the seed of a plant of an oval figure, crowned with a tuft of hairs.

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(1) Lat. Ib., III, p. 144; *Naucoris oculata*, Fab.

(2) Fab., Syst. Ryng.; Lat., Gener. Crust. et Insect., III, p. 146.

(3) Lat., Ib., p. 144; the *Nepa grandis, annulata, rustica*, Fab.

M. Leon Dufour, in the seventh volume of the Animales Générales des Sciences Physiques, has published some very curious observations on the anatomy of the *Ranatra linearis*, and of the *Nepa cinerea*. He has discovered in these Insects a peculiar organ which he considers as a kind of pectoral trachea communicating with the ordinary tracheæ. In the first it forms a pair of beautiful tufts of a nacre-white, and is composed of numerous ramusculi which are directed round a multiplex axis. It is situated in the midst of the muscular masses of the pectus. The pectoral tracheæ of the Nepa cinerea appeared to exhibit the vestiges of a pulmonary organ. They consist of two oblong bodies situated immediately under the region of the scutellum, invested by a fine, smooth, satin-white membrane. They are almost as long as the pectus, and, except at the two ends, free. They are filled with a kind of tow which when examined under the microscope presents a homogeneous tissue formed of vascular arbusculi. The nervous system appeared to him to consist of two stout ganglions, one on the esophagus and the other in the pectus, between the first and second pair of legs, which give off two remarkable cords divided at their extremity into two or three filaments. He could only perceive two biliary vessels. To this excellent Memoir we refer the reader both for these details and those relative to the organs of generation, and to the salivary apparatus discovered by its author in these Insects.

N. cinerea, L.; Rœs., Insect. Ib., xxii. About eight lines in length; cinereous; back of the abdomen red; tail rather shorter than the body(1).

RANATRA, Fab.

The Ranatræ only differ from the Nepæ in the linear form of their body, in their rostrum, which is directed forwards, and in their anterior legs, of which the coxæ and thighs are elongated and slender.

R. linearis; Nepa linearis, L.; Rœs., Ib. XXIII. An inch long; pale-cinereous, somewhat yellowish; tail as long as the body.

The tuft on its eggs consists of but two setæ(2).

The others—*Notonectides*—have their two anterior legs simply curved underneath, with thighs of an ordinary size, and the tarsi pointed and densely ciliated, or similar to those of the posterior ones. Their body is almost cylindrical or ovoid, and tolerably thick or less depressed than in the preceding Insects. Their posterior legs are densely ciliated, resemble oars, and are terminated by two very small and rather indistinct hooks. They swim or row with great swiftness, and frequently while on their back. They compose the genus

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(1) Add *N. fusca, grossa, rubra, nigra, maculata*, Fab.

(2) For the remaining species, see Fab., Syst. Ryng.

NOTONECTA, Lin.

Which has been divided in the following manner:

CORIXA, Geoff.—*Sigara*, Fab.

Where the scutellum is wanting(1); the rostrum is very short, triangular, and transversely striated; the elytra are horizontal; the anterior legs are very short, and their tarsi formed of a single compressed and ciliated joint; the other legs are elongated, and the two intermediate ones are terminated by two very long hooks.

C. striata; Notonecta striata, L.; Rœs., Ib., XXIX. The largest specimens are about five lines in length; dark brown above, with numerous yellowish dots or little stripes; head, legs, and all underneath, yellowish(2).

NOTONECTA, Geoff. Fab.

Where the scutellum is very distinct, the rostrum forms an articulated and elongated cone, the wings are tectiform, and all the tarsi biarticulated. The four posterior legs are geniculate, and have simple, cylindrical tarsi, terminated by two hooks.

N. glauca, L., Rœs., Ib., XXVII. Six lines in length; yellowish above, with a russet tint on the elytra, the inner margin of which is spotted with blackish; scutellum black.

To seize its prey with more facility it swims on its back; it stings severely(3).

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(1) The *Notonecta minutissima*, Fab., is the type of the genus *Sigara* of Leach—Lin. Trans., XII. The anterior tarsi, as in Corixa, consist of one joint, but this Insect is furnished with a scutellum. Its thorax is transversal, and body oval, and not linear or cylindrical.

(2) For the other species, see Fab., Syst. Ryng.

(3) Fab., Syst. Ryngot.; Lat., Gener. Crust. et Insect., III, p. 150. The genus *Plea*, Leach, which that gentleman establishes on the *Notonecta minutissima* of Linnæus, and which must not be confounded with the one so styled by Fabricius and other entomologists, differs from Notonecta, inasmuch as the third joint of the

The second section of the Hemiptera, that of the HOMOPTERA, Lat., is distinguished from the preceding one by the following characters: the rostrum arises from the lowest portion of the head, near the pectus, or even from the interval between the two anterior legs: the elytra—almost always tectiform—are of the same consistence throughout and semimembranous, sometimes almost similar to the wings. The three segments of the trunk are united en masse, and the first is frequently shorter than the second.

All the Insects of this section feed exclusively on vegetable juices. The females are provided with a scaly ovipositor(1), usually composed of three dentated blades, and lodged in a groove with two valves. They use it as a saw to produce openings in plants in which they deposit their eggs. The last Insects of this section experience a sort of complete metamorphosis.

I will divide it into three families.

FAMILY I.

CICADARIÆ.

This family comprises those which have triarticulated tarsi, and usually very small, conical, or fusiform antennæ, composed of from three to six joints, the extremely attenuated seta which terminates them included. The females are provided with a serrated ovipositor. MM. Randohr, Marcel de Serres, Leon Dufour, and Straus, have studied the anatomy

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antennæ is larger than the others, and because those of the anterior tarsi are almost of the same length, and the hooks of the posterior ones are large. The body is shorter, and the elytra entirely crustaceous, arched, and truncated at the exterior angle of their base. A piece is observed there, analogous to that remarked in the same place in the Cetoniæ.

(1) Called *oviscapte* by M. Marcel de Serres.

of several Insects belonging to this family. The latter naturalist has not yet published the result of his investigations. The researches of M. Dufour are the most extensive and complete, at least so far as respects the digestive system and the organs of generation. A proof of this is readily obtained by referring to his Memoir entitled *Recherches Anatomiques sur les Cigales*, inserted in the fifth volume of the Annales des Sciences Naturelles. We will not follow this profound observer into the multitude of interesting details respecting their organization which he presents to us, and which he accompanies with excellent figures, but restrict ourselves to the description of an anatomical character which appears to be exclusively peculiar to these Insects.

In all of them, according to him, the chylific ventricle or stomach is remarkably long; it commences by a curved or straight, oblong dilatation, and always terminates in an intestiniform canal, which is flexed on itself in order to arrive at the origin of this same ventricle, into which it opens by the side of the insertion of the hepatic vessels, not far from the commencement of the intestine; they all have four biliary vessels. In the Cicadæ this ventricle has the figure of an ear, of which the right side is dilated into a large lateral and frequently plaited pouch; its upper extremity is tied to the esophagus by a superior ligament, and the other leads to this narrow, very long, tubular, reflected prolongation which has the form of an intestine, and which, after these circumvolutions, reascends to join that pouch near the insertion of the hepatic vessels. This singular disposition of the chylific ventricle which after several convolutions empties into itself, in continuing a complete circle traversed by the alimentary liquid, is doubtless a difficult matter to explain physiologically, but it is not the less a well determined and constant fact, and one which forms the most characteristic trait in the anatomy of the Cicada and other Cicadariæ. In the *Ledra aurita* of Fabricius, or *Procigale Grand-diable* of Geoffroy, the inflated portion of the chylific ventricle is placed directly after the crop, and there is but a single cluster of salivary sacs on each side, a character also observed in the *Cercopis spumaria*, while in the Cicadæ there are four, two on each side. In the *Membracis cornutus* the duodenal ear-like sac is replaced by a large pouch, but also attached to the esophagus by a suspensory filament, a character exclusively peculiar to these Insects.

Some—*Cantatrices*—have antennæ composed of six joints, and three simple eyes(1). They embrace the division of the Manniferæ of Linnæus, the genus *Tettigonia* of Fabricius, and form that of our Cicadæ proper.

CICADA, Oliv.—*Tettigonia,* Fab.

These Insects, of which the elytra are almost always transparent and veined, differ from the following ones, not only in the composition of their antennæ and the number of the ocelli, but in the absence of the faculty of leaping, and in the music of the males; which, in the heat of summer, the epoch of their appearance, produce that loud and monotonous sound which has induced authors to designate them by the name of Cantatrices or Singers.

The organs by which it is effected are situated on each side of the base of the abdomen; they are internal and each one is covered by a cartilaginous plate, which closes like a shutter(2). The cavity which encloses this apparatus is divided into two cells by a squamous and triangular septum. When viewed from the side of the abdomen, each cell presents anteriorly a white and plaited membrane, and lower down, in the bottom, a tight, thin, transparent membrane, which Reaumur terms *le miroir*. If this part of the body be opened above, another plaited membrane is seen on each side, which is moved by an extremely powerful muscle composed of numerous, straight, and parallel fibres, and arising from the squamous septum. This membrane is the tymbal. The muscles, by rapidly contracting and relaxing, act on the tymbals, alternately tightening and restoring them to their original state. Such is the origin of these sounds, which can even be produced after the death of the Insect, by jerking the muscle.

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(1) The mesothorax, viewed from above, is much more spacious than the prothorax, and is narrowed towards the extremity, which forms a sort of scutellum. We observe nearly the same disposition of parts in Fulgora, and other genera which are derived from it. The mesothorax has frequently the form of a reversed triangle, and the prothorax is generally very short and transversal. In the following Cicadariæ, such as the Membraces, Cicadellæ, &c., it is, on the contrary, longer than the other thoracic segments, greatly developed in one direction or another, and the mesothorax is only visible in the form of an ordinary and triangular scutellum. In all this family, the metathorax is very short and concealed. Considered in its relation to other Insects, the head of the Cicadariæ, viewed anteriorly, presents a triangular space immediately above the labrum, corresponding to the epistoma or clypeus; then, still higher up, another space, frequently inflated and striated, termed by Fabricius the frons, but which is analogous to the face or interval between the eyes; above this comes the frons, and then the vertex.

(2) This piece is merely an inferior appendage of the metathorax. 'The tymbal occupying a particular cavity, sometimes exposed above, sometimes covered and only visible beneath, is a lateral prolongation of a skin which forms the anterior diaphragm of the two inferior cavities of the first segment of the abdomen. The opposite diaphragm, or the posterior of these cavities, constitutes the piece called the mirror, or miroir. It appears, that, like the other diaphragm, it is formed at the expense of the tracheal membranes.

The Cicadæ live on trees or shrubs, of which they suck the juices. The female, by means of an ovipositor enclosed in a bilaminated semitubular sheath, and composed of three narrow, elongated, squamous pieces, two of which terminate in the form of a file, pierces the dead twigs to the medulla, in which she deposits her eggs. As the number of the latter is considerable, she makes several holes, indicated externally by as many elevations. The young larvæ however leave their asylum to penetrate into the earth, where they grow and experience their metamorphosis. Their anterior legs are short, have very stout thighs armed with teeth, and are adapted for digging. The Greeks ate the pupæ, which they called *Tettigometra*, and even the perfect Insect. Previous to coition they preferred the males, and when it had taken place the females were most sought for, as their abdomen is then filled with eggs.

The *C. orni*, by wounding the tree from which its specific name is derived, produces that peculiar honey-like and purgative juice called manna.

C. orni, L. Rœs., Insect. II, Locust. xxv, 1, 2; xxvi, 3, 5. About an inch long; yellowish; pale beneath, the same colour mixed with black above; margin of the abdominal segments, russet; two rows of blackish points on the elytra, those nearest their inner margin the smallest. South of France, Italy, &c.

C. plebeia, L.; *Tettigonia fraxini*, Fab.; Rœs., Ib. XXV, 4, 6, 7, 8. The largest species in France; black, with several spots on the first segment of the trunk; its posterior margin, the raised and arcuated portions of the scutellum, and several veins of the elytra, russet(1).

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(1) See Lat. Gener. Crust. et Insect., III, p. 154; Fab., Syst. Ryng., genus *Tettigonia*, and Oliv., Encyc. Méthod., article *Cigale*, where all the figures of Stoll,

The other Cicadariæ—*Mutæ*—have but three distinct joints in the antennæ, and two small ocelli. Their legs are usually adapted for leaping. Neither of the sexes is provided with organs of sound.

The elytra are frequently coriaceous and opaque. Several females envelope their eggs with a white substance resembling cotton.

Some of them—*Fulgorellæ*—have the antennæ inserted immediately under their eyes, and the front frequently prolonged in the form of a snout, the figure of which varies according to the species. By this we distinguish the genus

FULGORA, Lin. Oliv.

Those species in which the front projects, that have two simple eyes, and which present no appendage under the antennæ, are the *Fulgoræ*, properly so called, of Fabricius. Such is

F. laternaria, L.; Rœs., Insect. II, Locust., xxviii, xxix. A very large species, prettily variegated with yellow and russet; a large ocellated spot on each wing; snout strongly dilated, vesicular, broad, and rounded anteriorly. Travellers assure us that this Insect diffuses a strong light when in the dark.

The south of Europe produces a small species of the same genus. It is the

F. europæa, L.; Panz., Faun. Insect. Germ., XX, 16. Green, with a conical front, and transparent elytra and wings(1).

Other Cicadariæ with a projecting front, but destitute of simple eyes, and furnished with two little appendages under each antennæ representing those organs or palpi, form the genus

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relative to the species of this genus, are given. Those, in which the first abdominal segment presents a cleft above that exposes the tymbal, compose the genus *Tibicen* of my Fam. Nat. du Règn. Anim.; such are the *C. hæmatoda* of Olivier, the *T. picta, hyalina, algira* of Fabricius, and his *T. orni*, which, in this respect, might form another genus.

(1) For the other species, see Fab., Ib., and Oliv., Encyc. Méthod., article *Fulgore*.

Otiocerus, Kirb.

Or the *Cobax* of Germar, which hitherto seems to be peculiar to the western continent(1).

Those, in which the head presents no remarkable projection, compose various genera of Fabricius, to which must be added some others established since the time of that naturalist.

Sometimes the antennæ are shorter than the head, and inserted out of the eyes, a character which is also common to the two preceding genera.

Here we distinguish two very apparent ocelli.

Lystra, Fab.

These Insects at the first glance resemble little Cicadæ, properly so called. The body and elytra are elongated. The second joint of the antennæ is almost globular and granose, as in the Fulgoræ(2).

Cixius, Lat.

The Cyxii resemble the Lystræ, but the second joint of the antennæ is cylindrical and smooth(3).

Under the generic appellation of

Tettigometra, Lat.

I have separated certain Insects analogous to the preceding species, but in which the antennæ are lodged between the posterior and lateral angles of the head, and those of the anterior extremity of the thorax. The eyes are not prominent(4).

There, we observe no ocelli.

Those species that have large elytra, and in which the prothorax is sensibly shorter in its middle than the mesothorax, compose the subgenus

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(1) Lin. Trans., XII, *O. Coquebertii*, I, 14 and I, 8;—genus *Cobax*, Germ., Magas. der Entom., IV, p. 1, et seq.

(2) Fab., Syst. Ryngot., p. 56;—Lat., Gener. Crust. et Insect., III, p. 166.

(3) Lat., Ib. Fabricius places them among his *Flata*. The *Achili* of M. Kirby—Lin. Trans., XII, xxii, 13—differ but little from the Cixii.

(4) Lat., Gen. Crust. et Insect., III, p. 163;—Germ., Magas. der Entom., IV, 7. The Cælidiæ of this author—Ib., p. 75—seem to approach the Tettigometræ. They have the same port, and, according to him, their antennæ are inserted under the eyes.

Pœcilоptera, Lat. Germ.—*Flata*, Fab.(1)

Those, in which it is at least as long as the mesothorax, and where the elytra, hardly longer than the abdomen, or shorter, are dilated at their base, and afterwards narrowed, form another subgenus, the

Issus, Fab.(2)

Sometimes the antennæ are at least as long as the head, and most frequently inserted into an inferior emargination of the eyes.

Anotia, Kirb.,

Which in a natural order comes near his Otiocerus, and approximates to Issus in the insertion of the antennæ(3).

Asiraca, Lat.—*Delphax*, Fab.

Where the antennæ are inserted into an inferior emargination of the eyes, are as long as the head and thorax united, and have their first joint usually longer than the second, compressed and angular. There are no simple eyes(4).

Delphax, Fab.

Where the antennæ are inserted in a similar manner, but are never much longer than the head; the first joint is much shorter than the following one and without ridges. The simple eyes are apparent(5).

Derbe, Fab.

These Insects are unknown to me; I presume, however, that they approach those of the preceding subgenera, that of Anotia in particular.

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(1) Lat., Ib., p. 165;—Germ., Magas. der Entom., III, p. 219; IV, p. 103, 104.
(2) Lat.. Ib., p. 166; Fab., Syst. Ryng., p. 199.
(3) Lin. Trans., XIII, pl. i, fig. 9, 10, 11, 15.
(4) Lat., Ib., p. 167.
(5) Lat., Gen. Crust. et Insect., III, p. 168.

In the last of the Cicadariæ, the antennæ are inserted between the eyes; they compose the genus

CICADELLA.—*Cicada ranatra*, Lin.

Which may be thus subdivided:

We will begin with those species, the Ledræ excepted, which formerly composed the genus MEMBRACIS of Fabricius. Their head is strongly inclined or lowered anteriorly, and prolonged into an obtuse point, or in the form of a clypeus, more or less semicircular. The antennæ are always very small, terminated by an articulated seta, and inserted into a cavity under the margin of the head. The prothorax is sometimes dilated and horned on each side, prolonged and narrowed posteriorly into a point or spine, either simple or compound, sometimes elevated longitudinally along the back, compressed into a kind of edge or crest, and sometimes projecting and pointed anteriorly; the legs are scarcely spinous.

Some have no apparent or exposed scutellum, properly so called. Here, the tibiæ, the anterior ones particularly, are strongly compressed and foliaceous. The top of the head always forms a sort of semicircular clypeus.

MEMBRACIS, Fab.

Where the prothorax is elevated, compressed and foliaceous along the middle of the back(1).

TRAGOPA, Lat.

Where that part of the body presents, on each side, a horn or pointed projection without any intermediate elevation, and is prolonged posteriorly into an arched point of the length of the abdomen, and replacing the scutellum(2).

There, the tibiæ are of the ordinary form or non-foliaceous.

DARNIS, Fab.

Where the posterior prolongation of the prothorax covers the top of the abdomen almost wholly or for the greater part, and the elytra form an elongated and arched triangle(1).

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(1) The *Membracis foliaceus*, Fab.

(2) Membraces from the Brazils, which appear to me to be analogous to the following species of Germar, *glabra*, *albimacula* and *xanthocephala*.

Bocydium, Lat.

Where the elytra are wholly or mostly exposed, the posterior and scutellar prolongation of the prothorax being narrow and more or less lanceolate or spiniform(2).

In the others, the scutellum is at least partially exposed, although the prothorax may be prolonged; the posterior extremity of the prothorax presents a transverse suture, which distinguishes it from the scutellum.

Centrotus, Fab.

Such are the

C. cornutus; Cicada cornuta, L; Panz., Faun. Insect. Germ., L, 19. Length four lines; thorax furnished with a horn on each side, and prolonged posteriorly into a point as long as the abdomen.—In the woods on Filices and other plants.

C. genistæ, Fab.; Panz., Ib., 20. But half the size of the cornutus, with its thorax simply prolonged posteriorly.—On the Genistæ(3).

We will now pass to those species in which the head is scarcely lower than the prothorax, or is level with it, and horizontal or but slightly inclined when seen from above; where the prothorax is neither raised in the middle nor prolonged posteriorly, and at most only presents lateral dilatations; and where the mesothorax has the form of an ordinary sized and triangular scutellum. The elytra are always entirely exposed, and the posterior tibiæ at least, always spinous.

In several, such as the following, the thorax has the figure of an irregular hexagon; it is prolonged and narrowed posteriorly, and terminates by a truncation, so as to serve as a point d'appui to the base of the scutellum, and even frequently receiving it, this truncated part being concave or emarginated.

Ætalion, Lat.—*Ætalia*, Germ.

The Insects of this subgenus are distinguished from those of other subgenera of the same division by several characters. The head, viewed from above, merely presents a transversal edge; the front is abruptly inclined, and the ocelli are situated there between the ordinary eyes, and consequently inferiorly. The antennæ, very small and distant from these latter organs, are inserted beneath an ideal line drawn from one to the other. The space immediately under the front is flattened and smooth. The tibiæ are neither ciliated nor dentated(1).

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(1) See Fab., Syst. Ryngot.

(2) The *Centrotus horridus, trifidus, globularis, clavatus, claviger*, Fab.

(3) The *C. cornutus, scutellaris*, &c., Fab.

In the three succeeding subgenera, the vertex is triangular and bears the ocelli. The antennæ are inserted in an ideal line drawn from one ordinary eye to the other or above it.

Ledra, Fab.

Where the head is much flattened before the eyes, in the form of a transversal clypeus, arcuated, and terminated in the middle of the anterior margin by an obtuse angle. All the under part of the head is plane or on a level. The sides of the prothorax project in the manner of horns rounded at the extremity, or of pinions. The posterior tibiæ are strongly compressed and as if bordered externally by a dentated membrane. The

L. aurita; Cicada aurita, L.; *Cigale Grand-Diable*, Geoff., belongs to this subgenus(2).

Ciccus, Lat.

Where the antennæ terminate directly after the second joint in a seta composed of five distinct, cylindrical, and elongated joints. The anterior extremity of the head usually projects(1).

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(1) Lat., Consid., sur l'Ord. des Crust. des Arach. et des Insect. and the Zool., and Anat. of MM. Humboldt and Bonpland. See Germar, Magas. der Entom., IV, p. 94.

(2) See Fab., Syst. Ryngot., and Lat., Gener. Crust. et Insect., III, p. 157. See also Encyc. Méthod., Insect., X, 600, article *Tettigone*, and also *Tettigonides*, Ib., where the editors, Messrs Lepeletier and Serville, offer some new considerations and establish new genera, but with which I was unacquainted until I had terminated my work on this family, and consequently had no time to verify, on the Insects themselves, the characters which they assign to those sections. I will restrict myself to the following remark. The description of the *Eurymèle fenestrée* exactly agrees with a species figured by Donovan, in his splendid work on the Insects of New Holland, and consequently the editors of the article in question must have been deceived as to the habitat of this Insect, which they say is from Brazil. In case this synonyme be correct, the distinctive character of this new genus, the absence of simple eyes, would be false, for they exist on the superior part of the front, although, at first, they are not easily perceived. This species would then re-enter the subgenus *Jassus*.

CERCOPIS, Fab. Germ.—*Aphrophora*, Germ.

Where the third joint of the antennæ is conical and terminated by an inarticulated seta.

C. sanguinolenta, Fab.; *Cigale à taches rouges*, Geoff., Insect., II, vii, 5. Four lines in length; black, with six red spots on the elytra.—In woods.

C. spumaria; Cicada spumaria, L.; Rœs., Insect., II, Locust., xxiii. Brown, with two white spots on the elytra near their exterior margin. Its larva lives on leaves in a spumous and white fluid, called *Ecume printanière, Crachat de Grenouille*(2).

In the other Cicadariæ that complete this family, and which in the early works of Fabricius composed his genus *Cicada*, the prothorax is not prolonged posteriorly (or hardly not) and terminates at the height of the origin of the elytra in a straight line, or in one that is nearly so, the length of which is almost equal to the width of the body. The scutellum, measured at base, occupies a large portion of this breadth.

Two very prominent eyes, a head projecting somewhat beyond those organs, but depressed anteriorly, and forming a sort of arch at the summit of the elevated portion of the face, situated directly beneath, two superior posterior ocelli, and, finally, by an exception in this division, legs destitute of spines or teeth, distinguish the

EULOPA, Fall.

To this subgenus belongs the species which he calls the

E. obtecta; Cercopis ericæ, Arh., Faun. Insect., III, 24. It is about one line in length; reddish and spotted with white; the elytra are marked with two oblique bands of the same colour, and numerous and projecting nervures. The head is broad and as if truncated anteriorly(1).

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(1) The *Cicada adspersa* and *marmorata*, Fab.; his *Fulgora adscendens*, &c. I presume that several other species of the genus *Cicada* of this author, and of the *Tettigonia* of M. Germar, should also be referred to it; my collection of them, however, not being sufficiently numerous, I content myself with these indicia.

(2) This species, and some other Cercopes of Fabricius form the genus *Aphrophora* of M. Germar. The posterior margin of the head is concave, and their simple eyes are more distant from each other than in Cercopis proper. See his Magas. der Entom., vol. IV.

Eupelix, Germ.

Where the head is much flattened and forms an elongated triangle, with the ocelli situated before the ordinary eyes on its edges, which are prolonged over those organs and intersect them longitudinally throughout the greater portion of their extent(2).

Penthimia, Germ.

Where the antennæ are inserted in a large fossula, which narrows, more than is usual, the space comprised between the eyes. The head, which viewed from above appears semicircular and gradually inclined anteriorly, is rounded, and its edges project above this fossula. The simple eyes are situated near the middle of the vertex. The body is short. These Insects at a first glance somewhat resemble the Cercopes, and in fact Fabricius confounds them(3).

Near this subgenus we should apparently place that of the Gypona, Germar, of which however I have never seen a specimen(4).

Jassus, Fab. Germ.

Where the vertex or superior plane of the head comprised between the eyes is very short, transversal, and linear, or in the form of a bow, and projects but little beyond the eyes even in the middle. The laminæ which support the sides of the clypeus are large. The antennæ are terminated by a long seta. The ocelli are situated near its anterior margin, and even under it(5). In

Tettigonia, Oliv. Germ.—*Cicada*, Lin. Fab.

Or the Cicadellæ or Tettigoniæ, properly so called, the head, viewed from above is triangular, without however being much elongated or flattened; a character which distinguishes these Insects from the Eupelices. The eyes are not cut by its edges. The simple eyes are situated between them or laterally(1), but not near the front.

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(1) Germ., Magas. der Entom., IV, p. 54.

(2) Ibid., p. 53; *Cicada cuspidata*, Fab.

(3) The *C. atra, hæmorrhoa, sanguinicollis*, Germ., Magas. der Entom., IV, p. 47.

(4) Germ., Ibid., p. 73.

(5) Germ., Ibid., p. 80.

These Insects are also closely allied to the Jassi by the extent of their laminæ, situated along the sides of the hood, and the length of the terminal seta of the antennæ; it appears to be articulated at base as in the Cicci, from which they almost only differ in the form of the thorax(2).

FAMILY II.

APHIDII.

The second family of the homopterous Hemiptera, or the fourth of the order, is distinguished from the preceding one by the tarsi, which are composed of but two joints, and by the filiform or setaceous antennæ, which are longer than the head and have from six to eleven joints.

Those individuals which are winged always have two elytra and two wings.

These Insects are very small; their body is usually soft, and their elytra are nearly similar to the wings, or only differ from them in being larger and somewhat thick. They are astonishingly prolific.

Here the antennæ are composed of from ten to eleven joints, the last of which is terminated by two setæ.

They possess the faculty of leaping, and form the genus

PSYLLA, Geoff.—*Chermes*, Lin.

These Hemiptera, also called pseudo-aphides, or faux-pucerons, live on the trees and plants from which they derive their nourishment; both sexes are furnished with wings. Their larvæ usually have a very flat body, broad head, and the abdomen rounded posteriorly. Their legs are terminated by a little membranous vesicle accompanied beneath with two hooks. Four wide and flat pieces, which are the sheaths of the elytra and wings, distinguish the nymph. Several in this state, as well as in the first, are covered with a white substance resembling cotton, arranged in flakes. Their fæces form threads or masses, of a gummy and saccharine nature.

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(1) Some species, such as the *Cercopis grisea*, *transversa*, *striata*, &c., Fab., on account of their flattened head furnished near its edges with simple eyes, should apparently be formed into a separate subgenus.

(2) Germar, Magas. der Entom., IV, p. 58, genus *Tettigonia*, Fab., Syst. Ryngot., p. 61.

Some species, by wounding plants in order to suck their juices, produce excrescences somewhat resembling gall-nuts, particularly on their leaves or buds. Of this number is the

P. buxi; Chermes buxi, L.; Reaum., Mem., Insect., III, xix, 1, 14. Green, with brown-yellowish wings.

Other species are also found on the Alder, Fig tree, Nettle, &c.(1)

A species which lives in the flowers of the rushes has been erected into a genus by Latreille, under the name of LIVIA. The antennæ are much thicker inferiorly than at their extremity(2).

The remaining Aphidii have but six or eight joints in the antennæ; the last is not terminated by two setæ.

Sometimes the elytra and wings are linear, fringed with hairs, and extended horizontally on the body, which is almost cylindrical; the rostrum is very small or but little distinct. The tarsi are terminated by a vesicular joint without hooks. The antennæ consist of eight graniform joints. Such are the Insects which form the genus

THRIPS, Lin.

They are extremely agile, and seem to leap rather than fly. When we irritate them beyond a certain point they turn up the posterior extremity of their body in the manner of the Staphylini. They live on flowers, plants, and under the bark of trees. The largest species scarcely exceed one line in length(3).

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(1) See Fab., Geoff., De Geer.

(2) Lat., Gen. Crust. et Insect., III, p. 170; Arh., Faun. Insect., VI, 21.

(3) See Lat., Ibid., p. ead., and the authors already quoted. In the organization of the mouth, I have detected characters which seem to distinguish it essentially from that of Insects of this order. M. Straus, who has studied it with admirable minuteness, thinks that Thrips belong to the order of the Orthoptera.

Sometimes the elytra and wings, oval or triangular, and without a fringe of hairs along the margin, are inclined or tectiform. The rostrum is very distinct. The tarsi are terminated by two hooks, and the antennæ have but six or seven joints. Such is the genus

Aphis, Lin.

Which we divide in the following manner.

Aphis,

Properly so called, where the antennæ are longer than the thorax and consist of seven joints, the third of which is elongated; the eyes are entire, and there are two horns or mammillæ at the posterior extremity of the abdomen.

Almost all of them live in society on trees and plants, of which they suck the juices with their trunk. The two horns observed at the posterior extremity of the abdomen in a great number of species are hollow tubes from which little globules of a transparent, honey-like fluid frequently exude, on which the Ant eagerly feeds.

In each community, during the spring and summer, we find Aphides that are always apterous, and semi-nymphs whose wings are yet to be developed; all these individuals are females, which produce living young ones that issue backwards from the venter of their mother, without previous copulation. The males, some of which are winged, and others apterous, only appear towards the end of summer or in autumn. They fecundify the last generation produced by the preceding individuals, which consists of unimpregnated apterous females. After coition the latter lay their eggs on branches of trees, where they remain during the winter, and from which, in the spring, proceed little Aphides, which soon multiply without the assistance of the males.

The influence of a first fecundation is also extended to seven successive generations. Bonnet, to whom we are indebted for m[illegible] of these facts, by isolating the females, obtained nine generations in the space of three months.

The wounds inflicted on the leaves or tender twigs of plants, by Aphides, cause those parts of the vegetable to assume a variety of forms, as may be observed on the shoots of the Lime tree, the leaves of Gooseberry bushes, Apple trees, and particularly those of the Elm, Poplar, Pistachio, in which they produce vesicles or excrescences enclosing colonies of Aphides, and frequently an abundant saccharine fluid. Most of these Insects are covered with a farinaceous substance, or cotton-like filaments, sometimes arranged in bundles. The larvæ of the Hemerobii, those of several Diptera, and of Coccinellæ, destroy immense numbers of Aphides. M. A. Duvau has communicated to the Académie des Sciences, the interesting result of his researches on these Insects. His Memoir has been inserted in the Annales du Muséum d'Histoire Naturelle.

A. quercus, L.; Reaum., Insect., III, xxviii, 5, 10. Brown; remarkable for its rostrum, which is at least thrice as long as the body.

A. fagi, L.; Reaum., Ib., xxvi, 1. Completely covered with white down resembling cotton(1).

Aleyrodes, Lat.—Tinea, Lin.

Where the antennæ are shorter and hexarticulated, and the eyes are emarginated.

A. proletella; Tinea proletella, L.; Reaum., Ib., II, xxv, 1, 7. Resembling a little Phalæna; white, with a blackish point and spot on each elytron. Under the leaves of the Chelidonium majus, Brassicæ, Oak, &c.

The larva is oval, much flattened, in the form of a little scale, and resembles that of the Psyllæ. The chrysalis is fixed and enclosed in an envelope, so that this Insect undergoes a complete metamorphosis.

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(1) M. Blot, corresponding member of the Linnean Society of Caen, had published, in the Mém. de la Soc. Lin. de Caen, 1824, p. 114, some curious observations on a particular species which is very injurious to the Apple-trees in the department of Calvados, by destroying their young shoots. He considers it as the type of a new genus, *Myzoxyla*. De Geer had previously described an Aphis of the same tree, but as Messrs Lepeletier and Serville—Encyc. Méthod., article *Puceron*,—justly remark, that species, although also hurtful to the Apple-tree, differs essentially from the preceding one. The abdomen of the other is not furnished with horns; its antennæ are shorter, and, according to M. Blot, present but five joints, of which the second is the longest. We suspect that it re-enters into our third division—Gener. Crust. et Insect.—of the genus Aphis. For the other species, see the works already quoted, and the Faun. Bavar., Schrank.

FAMILY III.

GALLINSECTA.

In this last family(1), of which De Geer makes a particular order, there are but five joints in the tarsi(2), with a single hook at the extremity. The male is destitute of a rostrum, and has but two wings, which are laid horizontally on the body, one over the other; the abdomen is terminated by two setæ. The female is apterous and provided with a rostrum. The antennæ are filiform or setaceous, and most commonly composed of eleven joints(3).

They constitute the genus

Coccus, Lin.

The bark of various trees is frequently covered with a multitude of little oval or rounded bodies, in the form of fixed shields or scales, in which, at the first glance, no external organs indicative of an Insect are perceptible. These bodies are nevertheless animals of this class and belong to the genus Coccus. Some are females, and the remainder young males, the form of both being nearly similar. An epoch, however, soon arrives in which all these individuals experience singular changes. They then become fixed; the male larvæ for a determinate period, requisite for their ultimate metamorphosis, and the females for ever. If we observe the latter in the spring, we shall find that their body gradually increases to a great volume, and finally resembles a gall-nut, being sometimes spherical, and at others reniform or scaphoid. The skin of some is smooth and level, that of the remainder presents incisures or vestiges of segments. It is in this state that the females receive the embraces of their males, soon after which they produce a great number of eggs. They slip them between the skin of their venter, and a white down which covers the spot they occupy. Their body then becomes desiccated and forms a solid crust or shell which covers their ova. Other females protect theirs by enveloping them with a white substance resembling cotton. Those which are spherical form a sort of box for them with their body. The young Cocci have an oval body, much flattened and furnished with the same organs as that of the mother. They spread themselves over the leaves, and towards the end of autumn approach the branches, on which they fix themselves to pass the winter. The females prepare to become mothers on the return of spring, and the males to transform themselves into chrysalides under their own skin. These chrysalides have their two anterior legs directed forwards and not backwards like their remaining four and the whole six in those of the other sex. Having acquired their wings, these males issue backwards from the posterior extremity of their domicil, and proceed immediately in search of their females. They are much smaller than the latter. Their copulating apparatus forms a recurved kind of tail between the two terminal setæ of the abdomen. Reaumur saw two granules resembling simple eyes on that part of their head which corresponds to their mouth. I have distinguished on the head of the male, *C. ulmi*, ten similar bodies, and two species of halteres on the thorax. Geoffroy says the females have four white threads at the posterior extremity of their abdomen, which are only visible by so pressing that part of the body as to make them protrude.

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(1) Or the *Gallinsectes* of the French naturalists. *Am. Ed.*

(2) M. Dalman, Director of the Cabinet of Natural History of Stockholm, in a Memoir on certain species of Coccus, presumes that there are three of these joints.

(3) Nine in the males described in this Memoir.

Dorthez has observed a species on the Euphorbium characias which appears to differ in form and habits from the others. This induced his friend, the late M. Bosc, to convert that species into a genus which he named *Dorthesia*. The antennæ consist of nine joints, those of the male being longer and more slender in the male than in the female. The latter continues to live and run about after laying her eggs. The posterior extremity of the male's abdomen is furnished with a tuft of white threads. This Insect is consequently more nearly allied to the Aphides than to the Cocci(1).

The Gallinsecta appear to injure trees by a superabundant sudoresis through the punctures they make in them, and of course those who cultivate the Peach, Orange, Fig and Olive are particularly on their guard against them. Certain species fix themselves to the roots of plants. Some are valuable for the rich red colour they furnish to the art of dyeing. Further researches on these Insects might eventuate in the discovery of others which would prove of similar utility.

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(1) M. Carcel, a zealous and learned entomologist, has lately confirmed these observations by new investigations. See the Nouv. Dict. d'Hist. Nat., 2d edit., article *Dorthès*.

Geoffroy divides the Gallinsecta into two genera, *Chermes* and *Coccus.* Reaumur designates the latter by the name of *Progall-Insecte.*

C. adonidum, L. Body almost rose-coloured and covered with a white farinaceous dust; wings and caudal setæ of the tail white; sides of the female furnished with appendages, the two last of which are the longest and form a sort of tail. She envelopes her ova with a white and cottony substance that serves for a nest. Naturalized in our green-houses where it does much injury.

C. cacti, L.; Thier de Menouv., De la Cult. du Nop., et de la Cochen. Female of a deep brown, covered with white dust, flat beneath, convex above and bordered; the annuli are tolerably distinct, but become obliterated at the epoch of production. The male is of a deep red, with white wings.

This Insect is cultivated at Mexico, on a species of Opuntia, and is distinguished by the name of *Mesteque*, fine cochineal, from another very analogous, but smaller and more cottony, or the *Sylvestre.* It is celebrated for the crimson dye it furnishes, which, by being combined with the solution of tin in nitro-muriatic acid, produces a scarlet. It is also from this Insect that we obtain carmine. It is one of the richest productions of Mexico(1).

C. polonicus, L.; Breyn., E, iv, c, 1731; Frisch, Insect., II, 5, p. 6. Female, russet-brown, resembling a granule, and attached to the roots of the *Scleranthus perennis,* and some other plants. Previous to the introduction of cochineal, this Insect constituted an important object of commerce. The colour it produces is of the same tint, and almost as beautiful as that of the preceding species. It is still employed in Germany and Russia.

C. ilicis, L.; Reaum., Insect., IV, v. The female, both in size and shape, like a pea. It is of a dark violet or prune-colour, covered with white dust. Found on a species of Oak in Provence, Languedoc, and southern parts of Europe. It is used in dyeing crimson, particularly in the Levant and Barbary. Scarlet was also obtained from it previous to the general introduction of the cochineal from Mexico. It is still used in medicine(1).

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(1) See Humboldt's Travels.

A certain species that inhabits the East Indies forms gum lac.

Another enters into the composition of a peculiar bougie employed in China(2).

A male Coccus from Java, remarkable for its antennæ, which are composed of about twenty-two joints, granose, and densely pilose, and that has two tolerably thick and almost coriaceous wings, is the type of the genus MONOPHLEBA of Leach.

ORDER VIII.

NEUROPTERA(3).

The Neuroptera are distinguished from the three preceding orders by their two upper wings, which are membranous, generally naked, diaphanous, and similar to the under ones in texture and properties. They are distinguished from the eleventh and twelfth by the number of these organs, as well as by their mouth, fitted for mastication or furnished with mandibles and true maxillæ, or in other words organized as usual, a character which also removes this order from the tenth or that of the Lepidoptera, where, besides, the four wings are farinaceous. The surface of these wings in the Neuroptera is finely reticulated, and the under ones are most commonly as large as those above them but sometimes wider, and sometimes narrower and longer. Their maxillæ and the inferior portion of their labrum or the mentum are never tubular. The abdomen is destitute of a sting and rarely furnished with an ovipositor.

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(1) For the other species, see Reaumur, Linnæus, Geoffroy, De Geer, Latreille and Olivier, Encyc. Méthod., article *Cochenille*. For the C. cacti, see a Literary Gazette printed at Mexico, 5th February 1794. M. Bory St Vincent—Annal. des Sc. Nat., VIII, 105—informs us that experiments had been made at Malaga, in Spain, with a view to introduce the cultivation of this latter species, and that they succeeded.

This valuable Insect might be easily and successfully cultivated in our southern states. The climate and soil are admirably adapted both to the propagation and health of the animal, and that of the plant on which it feeds. *Am. Ed.*

(2) Doctor Virey, Journ. Complément. des Sc. Méd., X, has published some new observations respecting this production.

(3) The *Odonata* and most of the *Synistata* of Fabricius.

Their antennæ are usually setaceous, and composed of numerous joints. They have two or three simple eyes. The trunk is formed of three segments, intimately united in a single body, distinct from the abdomen, and bearing the six legs; the first of these segments is usually very short, and in the form of a collar. The number of joints in the tarsi varies. The body is usually elongated, and with rather soft or but slightly squamous teguments; the abdomen is always sessile. Many of these Insects are carnivorous in their first state and in their last.

Some merely experience a semimetamorphosis, the rest a complete one; but the larvæ always have six hooked feet, which they usually employ in seeking their food.

I will divide this order into three families, which will successively present to us the following natural affinities:

1. Carnivorous Insects, subject to a semimetamorphosis, with aquatic larvæ.

2. Carnivorous Insects, subject to a complete metamorphosis, with aquatic or terrestrial larvæ.

3. Carnivorous or omnivorous terrestrial Insects, subject to a semimetamorphosis.

4. Herbivorous Insects, subject to a complete metamorphosis, with aquatic larvæ, which construct portable dwellings.

We will end with those species in which the wings are the least reticulated, and which resemble Phalænæ or Tineites.

FAMILY I.

SUBULICORNES, Lat.(1)

This family is composed of the order *Odonata* of Fabricius, and of the genus *Ephemera*. The antennæ are subulate, and hardly longer than the head; they are composed of seven joints at most, the last of which is setaceous. The mandibles and the maxillæ are completely covered by the labrum and labium, or by the anterior and projecting extremity of the head.

The wings are always reticulated and distant, sometimes laid horizontally and sometimes placed perpendicularly; the inferior are as large as the superior, or sometimes very small and even wanting. The ordinary eyes are very large and prominent in all of them; and they all have two or three ocelli situated between the former. The two first periods of their life are passed in the bosom of the waters, where they prey on living animals.

The larvæ and chrysalides, which approximate in form to the perfect Insect, respire by means of peculiar organs situated on the sides or extremity of the abdomen. They issue from the water to undergo their ultimate metamorphosis.

In some the mandibles and maxillæ are corneous, very strong, and covered by the two lips; the tarsi are triarticulated; the wings are equal, and the posterior extremity of the abdomen is simply terminated by hooks or laminiform or foliaceous appendages. They form the Fabrician order of the *Odonata*, or the genus

Libellula, Lin. Geoff.

The light and graceful figure of these Insects, the beautiful and variegated colours with which they are adorned, their large wings resembling lustrous gauze, and the velocity with which they pursue the Flies, &c., that constitute their food, attract our attention and enable us to recognize them with facility. Their head is large, rounded, or in the form of a broad triangle. They have two great lateral eyes(1) and three simple ones situated on the vertex; two antennæ, inserted into the forehead behind a vesicular prominence, composed of five or six joints, or at least of three, the last of which is compound and attenuated in the manner of a stylet; a semi-circular arched labrum; two very strong, dentated and squamous mandibles; maxillæ terminated by a piece of the same consistence that is dentated, spinous, and ciliated on the inner side, with a uniarticulated palpus laid on the back and representing the galea of the Orthoptera; a large, arched, trifoliate labium, of which the two lateral leaflets are palpi; a sort of epiglottis or vesicular and longitudinal tongue in the interior of their mouth; a thick and rounded thorax; a highly elongated abdomen which is sometimes ensiform, and at others resembles a rod, terminated in the males by two lamellar appendages varying in form according to the species(2); and, finally, short legs curved forwards.

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(1) A section, divided into two families, the Libellulinæ, in my Fam. Nat. du Règn. Animal.

The under part of the second annulus of the abdomen contains the sexual organs of the males, and as those of the females are situated on the last ring, the coition of these Insects is effected in a different manner from that of others. The male, first hovering over his female, seizes her by the neck with the hooks that terminate the posterior extremity of his abdomen, and flits away with her. After a shorter or longer period, the latter, yielding to his desires, curves her abdomen downwards, and approximates its extremity to the genitals of the male whose body is then bent into the form of a buckle. This junction frequently occurs in the air and sometimes on the bodies where they alight. To lay her eggs the female places herself on some aquatic plant that is raised but little above the water, into which she plunges the posterior extremity of her abdomen.

The larvæ and the chrysalides inhabit the water until the period of their ultimate metamorphosis, and, with the exception of wings, are tolerably similar to the perfect Insect. Their head, however, on which the simple eyes are not perceptible, is remarkable for the singular form of the piece which replaces the lower lip. It is a kind of mask that covers the mandibles, maxillæ, and almost the whole under part of the head. It is composed, 1, of a principal triangular piece that is sometimes arched and sometimes flat, called by Reaumur the *mentonnière* (chin-cloth), articulated by a hinge with a pedicle or sort of handle annexed to the head; 2, of two other pieces inserted at the superior and lateral angles of the former, movable at base, transversal, and either in the form of wide and dentated laminæ resembling shutters in their motion and the manner in which they close the mouth, or in the form of hooks or little claws. To this part of the mask where the *mentonnière* is articulated with its pedicle, or the knee, and which appears to terminate it inferiorly when the mask is flexed upon itself, Reaumur applies the name of *mentum*. The insect unfolds or extends it with great promptitude, and seizes its prey with the pincers of its superior portion. The posterior extremity of the abdomen sometimes presents five foliaceous and unequal appendages, which the animal can separate and approximate, in which case they form a sort of pyramidal tail; sometimes we observe the three elongated and pilose laminæ or a sort of fins. We see these Insects unfold them every moment, open their rectum, fill it with water, then close it, and shortly afterwards ejaculate that water mixed with large bubbles of air, a game that appears to facilitate their motions. The interior of the rectum(1) presents to the naked eye twelve longitudinal ranges of little black spots, approximated by pairs, resembling the pinnated leaves of botanists. By the aid of the microscope we discern that each of these spots is composed of little conical tubes, organized like tracheæ, and from which originate small branches that proceed to six large trunks of the principal tracheæ that traverse the whole length of the body.

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(1) For their structure, see Cuv., Mém. de la Soc. d'Hist. Nat., de Par., 4to, p. 41.

(2) MM. Van der Linden and Toussaint Charpentier have made a particular study of these appendages. The latter has carefully figured all these varieties in his *Horæ Entomologicæ*. The genus *Petalura*, Leach, Zool. Miscel., being essentially established on characters drawn from these appendages, appears to me to be inadmissible, and for the simple reason, that if this ground of division be once received, we shall have to establish almost as many genera as there are species.

Having attained the period of their ultimate metamorphosis, the nymphs issue from the water, climb along the stems of plants, fix there, and divest themselves of their skin.

M. Poe, who has paid particular attention to the Insects of the island of Cuba, informs me that at a certain season of the year the northern winds sweep an innumerable host of a species of this genus —specimens of which he had the kindness to send me—into Havana or its environs.

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(1) Cuv., Mém. de la Soc. d'Hist. Nat., 4to, p. 48.

Fabricius, anticipated in this point by Reaumur, divides the Libellulæ into three genera.

LIBELLULA, Fab.

. Or Libellula proper, where the wings are extended horizontally when at rest. The head is almost globular, with very large, contiguous or closely approximated eyes, and a vesicular elevation on the vertex, with an ocellus on each side; the other or anterior ocellus is much larger. The middle division of the labium is much smaller than the lateral ones(1), which unite beneath by a longitudinal suture, and close the mouth exactly. The abdomen is ensiform and flattened.

The larvæ and the nymphs have five appendages at the posterior extremity of the body, forming a pointed tail; their body is short, the *mentonnière* convex, in the form of a helmet, with the two pincers resembling shutters.

L. depressa, L.; Rœs., Insect. Aquat., VI, vii, 3. Brown somewhat yellowish; base of the wings blackish; two yellow lines on the thorax; abdomen ensiform, sometimes brown, and at others slate coloured, with yellowish sides(2).

ÆSHNA, Fab.

The Æshnæ resemble the Libellulæ proper in their mode of bearing their wings, and in the form of their head, but their two posterior ocelli are placed on a simple transverse elevation in the form of a carina. The intermediate lobe of the labium is also larger, and the two others are distant and armed with a very stout tooth and spiniform appendage. The abdomen is always narrow and elongated.

The body of the larvæ and the nymphs is also more elongated than that of the Libellulæ in the same states. The mask is flat, and the two pincers are narrow, and have a small movable nail at the extremity.

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(1) These lateral divisions or palpi present a remarkable difference in the three subgenera.

(2) For the other species, see Fabricius, Entom. Syst., and Latreille, Hist. Gener. des Crust. et des Insect., XII, p. 10, et seq.; but particularly the Monographs of the Insects of this family, from the environs of Bologne, published in Latin by M. Van der Linden, that which he has since given on the species of Europe, and finally another Monograph of European Libellulæ, forming a part of the already quoted work of M. Toussaint Charpentier.

The abdomen is terminated by five appendages, but one of them is truncated at the end.

Æ. grandis; Libellula grandis, L.; Rœs. Insect. Aquat., VI, iv. One of the largest species of this family, being nearly two inches and a half in length; fulvous-brown; two yellow lines on each side of the thorax; abdomen spotted with green or yellowish; wings iridescent. It darts with amazing rapidity over meadows, and along the shores of rivers, &c., pursuing flies in the manner of the Swallow(1).

Agrion, Fab.

Where the wings are elevated perpendicularly when at rest, the head is transversal, and the eyes are distant.

The form of the labium is analogous to that of the Æshnæ, but the intermediate lobe is divided in two, down to its base. The third joint of the lateral lobes is in the form of a membranous ligula. The antennæ seem to be composed of but four joints. The forehead presents no vesicle, and the simple eyes are almost equal, and arranged in a triangle on the vertex. The abdomen is very thin or even filiform, and sometimes very long. That of the females has its posterior extremity furnished with serrated laminæ.

The body of these Insects, in their first and second states, is equally slender and elongated, and the abdomen terminated by three fin-like laminæ. The mask is flat, the superior extremity of the mentonnière being raised into a point in some, and forked or sloped in others; the pincers are narrow, but terminated by several dentations, and resemble hands.

A. virgo; Libellula virgo, L.; Rœs., Insect. Aquat., VI, ix. Golden-green or green-blue; superior wings sometimes either entirely blue or only in the middle, and sometimes of a yellowish-brown. The mentonnière of the larvæ and nymph is sloped like a lozenge at the extremity, and terminated by two points.

A. puella; Libellula puella, L.; Rœs., Ib., x, xi. Very various as to colour; its abdomen is most commonly annulated with black, and the wings are colourless.

The superior extremity of the mentonnière of the larvæ and nymphs forms a salient angle(2).

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(1) See the same works. The *Æshna forcipata* might form another subgenus.

(2) For the other species, see Fabricius, Entom. Syst.; Lat., Hist. Gener. des Crust. et des Insect., XIII, p. 15; Olivier, Encyc. Méthod., article *Libellule*; and especially the preceding Monographs, where the variety of species and of their

The other Subulicornes have an entirely membranous or very soft mouth, composed of parts that are rather indistinct. Their tarsi consist of five joints; their inferior wings are much smaller than the superior, or even wanting, and their abdomen is terminated by two or three setæ.

They form the genus

EPHEMERA, Lin.

So called from their short term of life, in their perfect state. Their body is extremely soft, long, tapering, and terminated posteriorly by two or three long and articulated setæ. The antennæ are very small and composed of three joints, the last of which is very long, and in the form of a conical thread. The anterior part of their head projects in the manner of a clypeus, frequently carinated and emarginated, covers the mouth, the organs of which are so soft and exiguous that they cannot be distinguished. The wings of those Insects are always placed perpendicularly, or slightly inclined posteriorly, like those of an Agrion. The legs are very slender, and the tibiæ very short, and almost confounded with the tarsi, which frequently present but four joints, the first having nearly disappeared; the two hooks of the last one are strongly compressed into the form of a little palette; the two anterior legs, much shorter than the others, are inserted almost under the head and directed forwards.

The Ephemeræ usually appear at sunset, in fine weather, in summer and autumn, along the banks of rivers, lakes, &c., and sometimes in such innumerable hosts that after their death the surface of the ground is thickly covered with their bodies; in certain districts cart-loads of them are collected for manure.

The descent of a particular species—the *albipennis*—remarkable for the shortness of its wings, recals to our minds a heavy fall of snow in winter.

These Insects collect in flocks in the air, flitting about and balancing themselves in the manner of the Tipulæ, with the terminal filaments of their tail divergent. There the sexes unite. The males are distinguished from the females by two articulated hooks at the extremity of their abdomen, with which they seize them. It also appears that their anterior legs and caudal filaments are longer than those of the females, and that their eyes are larger: some of them even have four compound eyes, two of which are elevated and much

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sexual differences are carefully indicated, works that have greatly facilitated the disentangling of their synonomy.

larger than the others, called from their form *turban'd* or *columnar* eyes. The junction having been effected, the couples place themselves on trees or plants to complete their coitus, which lasts but for a moment. The female soon after deposits all her eggs in the water, collected in a bundle.

The propagation of their species is the only function these animals have to fulfil, for they take no nourishment, and frequently die on the day of their metamorphosis, or even within a few hours after that event. Those which fall into the water become food for Fishes, and are styled *Manna* by fishermen.

If however we trace them back to that period in which they existed as larvæ, we find their career to be much longer, extending from two to three years. In this state, as well as that of semi-nymphs, they live in water, frequently concealed, at least during the day, in the mud or under stones, sometimes in horizontal holes divided interiorly into two united canals, each with its proper opening. These habitations are always excavated in clay, bathed by water, which occupies its cavities; it is even supposed that the larvæ feed on this earth.

Although allied to the perfect Insect, when it has undergone its ultimate metamorphosis, in some respects they differ. The antennæ are longer; the ocelli are wanting; and the mouth presents two projections resembling horns, which are considered as mandibles. On each side of the abdomen is a range of laminæ or leaflets, usually united at base by pairs, which are a sort of pseudo-branchiæ over which the tracheæ extend and ramify, and which not only enable them to respire but also to swim and move with greater facility; the tarsi have but one hook at their extremity. The posterior extremity of the body is terminated by the same number of setæ as that of the perfect Insect.

The seminymph only differs from the larva in the presence of the cases which enclose the wings. When the moment of their development has arrived, it leaves the water, and having changed its skin, appears under a new form—but, by a very singular exception, it has still to experience a second change of tegument, before it is prepared to propagate its species. The ultimate exuvium of these Insects is frequently found on trees and walls; they sometimes even leave them on the clothes of persons who may be walking in their vicinity.

With this genus and that of the Phryganeæ, De Geer formed an order founded on the absence or extreme exiguity of the mandibles. In the "Tableau Elémentaire de l'Histoire Naturelle des Animaux" of the Baron Cuvier, they also constitute a separate family, that of the *Agnathes*, but still forming part of the order of the Neuroptera.

The number of wings and that of the filaments of the tail furnish the means of dividing the genus of the Ephemeræ.

E. Swammerdiana, Lat.; *E. longicauda*, Oliv., Swamm., Bib. Nat., II, xiii, 6, 8. The largest species known; four wings; two filaments to the tail twice or thrice the length of the body which is of a russet-yellow; eyes black. Holland and Germany, along the great rivers.

E. vulgata, L.; De Geer, Insect., II, xv, 9—15. Four wings; three filaments at the extremity of the abdomen; brown; abdomen deep yellow, marked with triangular black spots; wings spotted with brown.

E. diptera, L. But two wings; the male with four compound eyes, two of which are larger than the others and placed perpendicularly like two columns(1).

FAMILY II.

PLANIPENNES.

This family, which, with the third, forms the greater part of the order of the *Synistata* of Fabricius, comprises those Neuroptera in which the antennæ, always multiarticulated, are much longer than the head, without being subulate or styliform. Their mandibles are very distinct; their inferior wings almost equal to the superior ones, and extended or simply folded underneath at their anterior margin.

Their wings are almost always much reticulated and naked; their maxillary palpi are usually filiform or somewhat thicker at the extremity, shorter than the head, and composed of from four to five joints.

I will divide this family into five sections, which, by reason of the habits of the Insects that compose them, form as many small sub-families.

1. The Panorpatæ of Latreille, which have five joints

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(1) For the other species, see Olivier, Encyc. Méthod.; Fabricius; Latreille, Hist. Gener. des Crust. et des Insect., t. XIII, p. 93; and Lat. Gen. Crust. et Insect., III, p. 183.

to all the tarsi, and the anterior extremity of their head prolonged and narrowed in the form of a rostrum or proboscis.

They constitute the genus

Panorpa, Lin. Fab.

Where the antennæ are setaceous and inserted between the eyes; the clypeus is prolonged into a conical, corneous lamina, arched above to cover the mouth, and the mandibles, maxillæ and labium are almost linear. They have from four to six short, filiform palpi; in those of the maxillæ I could distinctly perceive but four joints.

Their body is elongated, the head vertical, the first segment of the trunk usually very small, in the form of a collar, and the abdomen conical or almost cylindrical.

There is much difference between the two sexes in several species. Their metamorphoses have not yet been observed.

In some, and the greater number, the naked or exposed portion of the thorax is formed of two segments, the first of which is the smallest. Both sexes are winged, and the wings are longer than the abdomen, adapted for flight, oval or linear, but not narrowed towards the extremity or subulate. Such are those which compose the

Nemoptera, Lat. Oliv.

Where the superior wings are distant, almost oval, and very finely reticulated; the inferior ones are very long and linear; no simple eyes.

The abdomen is nearly similar in form in both sexes. They appear to have six palpi, and hitherto seem to have been only observed in the most southern parts of Europe, in Africa, and in the adjacent countries of Asia(1).

Bittacus, Lat.

Where the four wings are equal and laid horizontally on the body. They are furnished with simple eyes; the abdomen is almost similar in both sexes, and the legs are very long; the tarsi are terminated by a single hook and are destitute of pellets(2).

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(1) Lat., Gen. Crust. et Insect., III, p. 186; Oliv., Encyc. Méthod., article *Némoptère*. Doctor Leach calls it *Monopteryx*; he has figured two species, *lusitanica* and *africana*, in his Zoological Miscellany, lxxxv.

(2) Lat., Gen. Crust. et Insect.

PANORPA, Lat.

The wings and simple eyes as in the preceding genus; but the abdomen of the males is terminated by an articulated tail, almost like that of the Scorpions, with a forceps at the extremity; that of the females ends in a point. The legs of both sexes are of a moderate length, with two hooks and a pellet at the extremity of the tarsi.

P. communis, L.; De Geer, Insect., II, xxiv, 34. From seven to eight lines in length; black; rostrum and extremity of the abdomen russet; wings spotted with black.—On hedges and in woods(1).

In others, the first segment of the thorax is large, and seems alone to form that part, the two following ones being covered by the wings in the males. The wings are subulate, recurved at the extremity, shorter than the abdomen, and wanting in the females where that part of the body is terminated by an acinaciform ovipositor.

BOREUS, Lat.

The only species of this genus known is the

B. hiemalis; *Panorpa hiemalis*, L.; *Gryllus proboscideus*, Panz., Faun. Insect. Germ., XXII, 18. It is found in winter, under moss, in the north of Europe and in the Alps(2).

2. The MYRMELEONIDES, which also have five joints in the tarsi, but their head is not prolonged anteriorly in the form of a rostrum or snout; their antennæ gradually enlarge or have a globuliform termination.

Their head is transverse, vertical, and merely presents the ordinary eyes, which are round and prominent; there are six palpi, those of the labium usually longer than the others, and inflated at the extremity. The palate of the mouth is elevated in the form of an epiglottis; the first segment of the thorax is small; the wings are equal, elongated, and tectiform; the abdomen is most frequently long and cylindrical, with two salient appendages at its extremity in the males. The legs are short.

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(1) For the other species, see Lat., Oliv., Ib., article *Panorpe*, and Leach, Zool. Miscell., xciv.

(2) Oliv., Ib., article, Ib.

They are found in the warm localities of the southern countries, clinging to plants, where they remain quiescent during the day. Most of them fly well. The nymph is inactive.

These Insects form the genus

MYRMELEON, Lin.

Of which Fabricius has made two.

MYRMELEON, Fab.

Or Myrmeleon proper, where the antennæ enlarge insensibly, are almost fusiform, are hooked at the extremity, and much shorter than the body; the abdomen is long and linear.

M. formicarium, L.; Rœs., Insect., III, xvii—xx. About an inch long; blackish spotted with yellowish; wings diaphanous, with black nervures picked in with white; some obscure spots, and one whitish, near the extremity of the anterior margin(1).

The number of Ants destroyed by the larva of this species, which is the most common one in Europe, has obtained for it the name of *Formica-leo, Lion-ant, or Fourmilion.* Its abdomen is extremely voluminous in comparison to the rest of the body. Its head is very small, flattened, and armed with two long mandibles in the form of horns, dentated on the inner side and pointed at the extremity, which act at once as pincers and suckers. Its body is greyish or of the colour of the sand in which it lives. Although provided with six feet, it moves very slowly and almost always backwards. Thus, not being able to seize its prey by the celerity of its motions, it has recourse to stratagem, and lays a trap for it in a funnel-shaped cavity which it excavates in the finest sand, at the foot of a tree, old walls, or acclivities exposed to the south. It arrives at the intended scene of its operations by forming a ditch, and traces the area of the funnel, the size of which is in proportion to its growth. Then, always moving backwards, and describing as it goes spiral convolutions, the diameter of which progressively diminishes, it loads its head with sand by means of one of its anterior feet, and jerks it to a distance. In this manner, and sometimes in the space of half an hour, it will remove a reversed cone of sand the base of which is equal in diameter to that of the area, and the height to about three-fourths of the same. Hidden and quiescent at the bottom of its retreat, with nothing visible but its mandibles, it awaits with patience till an Insect is precipitated into it; if it endeavour to escape, or be at too great a distance for it to seize, it showers upon it such a torrent of sand by means of its head and mandibles, as propels it stunned and defenceless to the bottom of the hole. Having exhausted its juices by suction, it drags away the carcass and leaves it at a distance from its domicil.

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(1) For the other species, see Lat., Gen. Crust. et Insect., III, p. 190; Oliv., Encyc. Méthod., article *Myrmeleon.* See also, both for this and the following genus, the work of M. Toussaint Charpentier, already quoted.

The nutritive matter it thus obtains is not converted into any perceptible excrement, neither is this larva—and such also is the case with several others—provided with an opening analogous to an anus. It can abstain from food for a long period without any apparent suffering.

When about to pass into the state of a chrysalis, it encloses itself in a perfectly round cocoon, formed of a silky substance of the colour of satin, which it covers externally with grains of sand. Its fusi are situated at the posterior extremity of the body. The perfect Insect makes its appearance at the expiration of fifteen or twenty days, and leaves its exuvium at the aperture it has effected in its cocoon.

Asoalaphus, Fab.

Where the antennæ are long and terminate abruptly in a button; the abdomen forms an oblong oval, and is hardly longer than the thorax.

The wings are proportionally wider than those of the Myrmeleones, and not so long.

Bonnet has observed, in the environs of Geneva, a larva similar to that of the preceding subgenus, but which neither moves backwards nor excavates a funnel. The posterior extremity of its abdomen is furnished with a bifid plate truncated at the end(1). It is perhaps the larva of the *Ascalaphus italicus*, peculiar to the south of Europe, and which now begins to appear in the neighbourhood of Paris and Fontainebleau(2).

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(1) This larva has also been found in Dalmatia by Count Dejean.

(2) The same works. For some species of New Holland, see Leach, Zool. Miscellany.

3. The **Hemerobini** of Latreille, which are similar to the Myrmeleonides in the general form of their body and wings; but their antennæ are filiform, and they have but four palpi. They form the genus

HEMEROBIUS, Lin. Fab.

In some, the first segment of the trunk is very small, and the wings are tectiform; the last joint of the palpi is thickest, ovoid and pointed. The larvæ are terrestrial. They form the genus

HEMEROBIUS, Lat.

Or Hemerobius properly so called, also styled *Demoiselles terrestres.* Their body is soft, and the globular eyes are frequently ornamented with metallic colours; the wings are large, and their exterior border is widened. They fly slowly and heavily; several diffuse a strong fæcal odour, with which the finger that has touched them remains for a long time impregnated.

The female deposits ten or twelve eggs on leaves; they are oval, white, and secured by a very long and capillary pedicle. Some authors have mistaken them for a species of mushroom. The larvæ bear a considerable resemblance to those of the preceding division; they are, however, more elongated and errant. Reaumur calls them *Lions des Pucerons*, because they feed on Aphides. They seize them with their horn-like mandibles, and soon exhaust them by suction. Some form a thick case for themselves of their remains, which gives them a very singular appearance. The nymph is enclosed in a silken cocoon of an extremely close tissue, the volume of which is very small when compared with that of the Insect. The fusi of the larvæ are situated at the posterior extremity of the abdomen, like those of the larvæ of the Myrmeleonides.

H. perla, L.; Rœs., Insect., III, Suppl., xxi, 4, 5. Green-yellow; eyes golden; wings transparent with entirely green nervures(1).

The *H. maculatus*, Fab., has three little ocelli, while in all the rest of the species they are wanting. It forms the genus

OSMYLUS, Lat.(2)

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(1) Add *Hemerobius filosus* and the *albus, capitatus, phalænoides, nitidulus, hirtus, fuscatus, humuli, variegatus,* and *nervosus,* Fab. See Lat., Gen. Crust. et Insect., III, p. 196.

(2) Lat., Ibid.

The same character is presented in the genus

NYMPHES, Leach,

Established on certain Insects from New Holland; but here the antennæ are filiform and shorter(1).

In the others the first segment of the thorax is large, and the wings are laid horizontally on the body; the palpi are filiform, and the last joint is conical or almost cylindrical, and frequently shorter than the preceding one. The larvæ are aquatic.

Fabricius unites them with the species of the genus *Perla* of Geoffroy, but which are removed from them by the number of joints in their tarsi, under the generic name of

SEMBLIS, Fab.

Which is composed of the following subgenera.

CORYDALIS, Lat.

Distinguished by the mandibles of the male which are very large and resemble horns(2).

CHAULIODES, Lat.

Where the antennæ are pectinated(3).

SIALIS, Lat.

Where the mandibles are moderate, as in the latter, and the antennæ simple as in Corydalis, and distinguished from the two preceding ones by the tectiform disposition of the wings. To this subgenus belongs the

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(1) *Nymphes myrmeleonides*, Leach, Zool. Miscell., xlv. Perhaps it may have six palpi, and in that case it belongs to the preceding division.

(2) Lat., Gen. Crust. et Insect., III, p. 199.

(3) Ibid., p. 198.

S. lutarius; Hemerobius lutarius, L.; Rœs., Insect., II, Class II, Insect. Aquat., xiii. Dead-black; light-brown wings thickly intersected with black nervures.

The female produces a prodigious number of eggs, which terminate abruptly in a little point, on the leaves of plants or on other bodies situated near water. The ova are implanted close together, perpendicularly and symmetrically, and form large brown plates. The larva inhabits the water, in which it runs and swims with great swiftness. The sides of its abdomen, like those of the Ephemeræ, are provided with pseudo-branchiæ, and its last ring is elongated into a kind of tail, but it is metamorphosed into an immovable nymph.

4. A fourth division, that of the TERMITINÆ, will comprise Neuroptera subject to a semi-metamorphosis. They are all terrestrial, active, carnivorous, or gnawers, in all their states. With the exception of the Mantispæ, very distinct from all the Insects of this order, by the form of their anterior legs, which resemble those of a Mantis, the tarsi consist of four joints at most, which removes them from the preceding genera of the same family. The mandibles are always corneous and strong. The inferior wings are nearly as large as the superior ones, and without folds, or smaller.

Some have from five to three joints in the tarsi, and very distinct and salient labial palpi. Their antennæ are generally composed of more than ten joints, the prothorax is large, and the wings are equal and multireticulated.

MANTISPA, Illig.—*Rhaphidia*, Scop. Lin.—*Mantis*, Fab. Pall. Oliv.

Where there are five joints to all the tarsi, and the two first legs are formed like those of a Mantis or adapted for prehension. The antennæ of these Insects are very short and granose, and their eyes large. The prothorax is very long, and thickened anteriorly, and the wings are tectiform(1).

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(1) Lat., Gen. Crust. et Insect., III, 93.

RHAPHIDIA, Lin. Fab.

Where the tarsi are composed of four joints and the wings are tectiform. The head is elongated and narrowed posteriorly, the thorax long, narrow, and almost cylindrical. The abdomen of the female terminates by a long external oviduct, formed of two laminæ.

R. ophiosis, L.; De Geer, Insect., II, xxv, 4—8. Half an inch long; black; abdomen marked with yellowish streaks; wings transparent, with a black spot near the extremity. In the woods.

The larva lives in the fissures of the bark of trees, and has the form of a little Serpent. It is very lively(1).

TERMES, HEMEROBIUS, Lin.

Where all the tarsi are likewise composed of four joints; but the wings are very long, and laid horizontally on the body; the head is rounded, and the thorax almost square or semicircular.

The body of these Insects is depressed, and their antennæ are short and formed like a chaplet. The mouth is almost similar to that of the Orthoptera, and the labium is quadrifid. They have three ocelli, one of which, on the forehead, is indistinct; the two others are situated, one on each side, near the inner margin of the ordinary eyes. Their wings are commonly somewhat diaphanous, coloured, furnished with extremely fine and crowded nervures, and not very distinctly reticulated. Their abdomen has two small, conical, biarticulated points at the extremity; the legs are short.

The Termites, peculiar to the countries situated between the tropics, or to those which are adjacent, are known by the name of *White Ants*, *Poux de bois*, *Caria*, &c. The appalling destruction caused by these Insects, particularly in the state of larvæ, in those parts of the world, is but too well known. These larvæ, the *working Termites* or *labourers*, bear a close resemblance to the perfect Insect; but their body is softer and apterous, and their head, which appears proportionally larger, is usually destitute of eyes, or has but very small ones. They live in society, and form communities, so numerous as to defy all calculation, which live under cover in the ground, trees, and all sort of ligneous articles, such as tables, chairs, furniture of all kinds, and the planks, timbers, &c. &c. which form parts of houses. There they excavate galleries, which form so many roads, all leading to the centre of their domicil, and these bodies thus mined, and retaining nothing but a superficial bark or covering, soon crumble into dust(1). If compelled by any insurmountable obstacle to leave their dwellings, they construct tubes or ways which still keep them from sight. The nests or domicils of several species are exterior, but have no visible opening. Sometimes they are raised above the surface of the ground, in the form of pyramids or turrets, occasionally surmounted with a capital or very solid roof, which by their height and number, resemble a little village. Sometimes they form a large globular mass on the branches of trees. Another sort of individuals, the *neuters*, also called *soldiers*, and which Fabricius erroneously considers as *nymphs*, defend the domicil. They are distinguished by their stouter and more elongated head, the mandibles of which are also longer, narrower and considerably crossed. They are much less numerous than the others, and remain near the surface of the habitation, are the first that present themselves in case of an attack, and pinch with considerable strength. It is also said that they force the *labourers* to work. The seminymphs have rudiments of wings, and in other respects resemble the larvæ.

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(1) Lat., Ib. p. 203; Fab., Entom. Syst., and Illiger's edit. of the Fauna Etrusca of Rossi.

Having become perfect Insects, the Termites leave their original retreat, and fly off at evening or during the night in incalculable numbers. At sunrise, they lose their wings, which are dried up, fall to the ground, and are mostly devoured by Birds, Lizards, and the rest of their enemies. According to Smeathmann, the larvæ seize upon all the couples they can find, and shut them up in a large cell, a sort of nuptial prison, where they supply them with nourishment. I have reason to believe, however, that their coitus, like that of the Ant, takes place in the air or beyond the precincts of their habitation, and that the females alone occupy the attention of the larvæ, with a view to the formation of a new colony. The abdomen of the female acquires an astonishing size, from the innumerable quantity of ova contained in it. The nuptial chamber is placed in the centre of the dwelling, and round it, symmetrically arranged, are the cells which contain the eggs and provisions.

The larvæ of certain Termites called *voyageurs* or *travellers*, are furnished with eyes, and appear to differ somewhat in their habits from the others, and in this respect, to approximate more closely to our Ants.

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(1) I saw a beautiful edifice in the Isle of France that was abandoned within a few months after it was completed, on this account. The whole building was a mere shell. *Am. Ed.*

The Negroes and Hottentots consider these Insects as a great delicacy. They are destroyed with quick-lime, or more readily with arsenic, which is thrown into their habitations.

The two following species, found in the south of France, live in the interior of various trees.

T. lucifugum, Ross., Faun. Etrusc., Mant. II, v, k. Glossy-black; wings brownish, somewhat diaphanous, with the rib more obscure; superior extremity of the antennæ, tibiæ and tarsi, pale-russet.

Such has been its excessive multiplication in the work-shops and store-houses of the navy-yard at Rochefort, where it does much injury, that it is impossible to destroy it.

T. flavicolle, Fab. This species only differs from the lucifugum in the colour of its thorax. It is very injurious to the Olive, particularly in Spain.

Linnæus has placed the larvæ of his genus *Termes* among the *Aptera*, and the winged individuals with the *Hemerobii*.

The species foreign to Europe have been but very imperfectly characterized. Linnæus confounds several under the name of *Termes fatale*(1).

In the remaining Termetinæ the tarsi are biarticulated, and the labial palpi indistinct and very short. The antennæ consist of about ten joints, the first segment of the trunk is very small, and the inferior wings are smaller than the others.

They form the genus

PSOCUS, Lat. Fab.—*Termes, Hemerobius,* Lin.

And are very small Insects with a short and extremely soft body that is frequently inflated, or as if hump-backed. Their head is large, their antennæ setaceous, and the maxillary palpi salient. Their wings are tectiform and but slightly reticulated or simply veined. They are extremely active and live under the bark of trees, in wood, &c.

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(1) See Lat., Gen. Crust. et Insect., III, p. 203, and the Nouv. Dict. d'Hist. Nat., article *Termès*.

Certain Insects from the southern countries of Europe and of Africa, analogous to the Termites, but in which the head is wider than the thorax; where the tarsi are triarticulated, the wings hardly extend beyond the abdomen or are wanting; where the legs are compressed, and the two anterior tibiæ are the widest; where the simple eyes are wanting, and the thorax is elongated, form the genus I have indicated in my Fam. Nat. du Reg. Anim., under the name of EMBIA; it is figured in the great work on Egypt.

The following species is commonly found in books and collections of Insects and plants.

> *P. pulsatorius; Termes pulsatorium*, L.; Schæff., Elem. Entom., cxxvi, 1, 2. Usually apterous; yellowish white; eyes and some small spots on the abdomen, russet. It was thought to produce that faint noise resembling the tick of a watch frequently heard in our houses, and of which we have spoken while on the genus Anobium—thence the origin of its specific name(1).

5. The PERLIDES, in which the tarsi are triarticulated, and the mandibles almost always partly membranous and small. The inferior wings are wider than the others, and doubled at their inner margin.

They comprise the genus

PERLA, Geoff.

Their body is elongated, narrow and flattened; the head is tolerably large, the antennæ are setaceous, and the maxillary palpi very salient. The first segment of their trunk is nearly square, and the wings are crossed and laid horizontally on the body; the abdomen terminates as usual by two articulated setæ.

Their larvæ are aquatic and inhabit sheaths or cases, which they construct in the manner of those formed by the Insects of the ensuing family, and in which they pass into the state of nymphs. They undergo their ultimate metamorphosis in the commencement of spring.

NEMOURA, Lat.

The Nemouræ differ from the Perlæ proper in their very apparent labrum, corneous mandibles, the almost equal length of the joints of their tarsi, and in the setæ of the extremity of the abdomen, which are almost wanting(1).

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(1) See Lat., Gen. Crust. et Insect., III, p. 207; Fab., Supp., Entom. Syst., and the Monograph of this genus in the Illust. Icon. des Insect., dec. I, of Coquebert. In the fourth volume of the Magasin der Entomologie of M. Germar, we find some anatomical observations on the common species—*pulsatorius*.

P. bicaudata; Phryganea bicaudata, L.; Geoff., Insect., II, xiii, 2. Eight lines in length; of an obscure brown with a yellow line along the middle of the head and thorax; nervures of the wings brown; setæ of the tail almost as long as the antennæ. Common in Europe in the spring along the banks of rivers(2).

FAMILY III.

PLICIPENNES(3).

In this family the mandibles are wanting, and the inferior wings are usually wider than the others and plaited longitudinally. It is formed of the genus

Phryganea, Lin. Fab.

These Neuroptera, at a first glance, have the appearance of little Phalænæ, and hence the name of *Mouches papillonacées* or papillonaceous flies, bestowed upon them by Reaumur. De Geer even observes that the internal organization of their larvæ bears the closest resemblance to that of caterpillars. Their head is small and presents two setaceous antennæ, usually very long and salient; rounded and salient eyes; two ocelli on the forehead; a curved or conical labrum; four palpi, those of the maxillæ commonly very long, filiform, or almost setaceous and composed of five joints, and the

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(1) See Lat., Gen. Crust. et Insect., III, p. 210; Oliv., Encyc. Méthod., article *Némoure; Phryganea nebulosa*, L., &c.

(2) Geoff. and Lat., Ibid.

(3) In the systems of Messrs Kirby and Leach, this family forms the order of the Trichoptera, which would connect itself with that of the Lepidoptera, through the Tineæ. But as we naturally pass from the Plicipennes to the Perlæ, by following the series of mutual relations, we should be forced to terminate the Neuroptera with the Libellulæ and Ephemeræ, whose organization and habits differ greatly from those of the Hymenoptera, which according to this method follow the Neuroptera. The Libellulæ and other Neuroptera, which in our system come directly after, appear to us to be those which approximate most nearly to the Orthoptera.

labials of three, the last of which is somewhat the thickest; maxillæ and a membranous labium united. The body is most frequently bristled with hairs and, with the wings, forms an elongated triangle, like several of the Noctuæ and Pyrales. The first segment of the thorax is small. The wings are simply veined, usually coloured, or almost opaque, silky or pilose in several, and always strongly tectiform. The legs are elongated, are furnished with small spines and have five joints in all the tarsi.

These Insects chiefly fly at night or during the evening, diffuse a disagreeable odour, frequently penetrate into houses, where they are attracted by the light, and are extremely quick and agile in all their motions. In coition they are joined end to end and remain so a long time. The smaller species flit about in flocks over ponds and rivers. Several females carry their eggs in a greenish bundle at the posterior extremity of their abdomen. De Geer saw some of these eggs which were enclosed in a glairy substance resembling the spawn of a Frog, and deposited on plants or other bodies on the banks of rivers, &c.

Their larvæ, called by some of the older naturalists *Ligniperdes* and by others *Charrées*, always, like the Tineæ, inhabit tubes that are usually cylindrical, covered with various substances which they find in the water, such as blades of grass, bits of reeds, leaves, roots, seeds, grains of sand, and even little shells, and frequently arranged symmetrically. They connect these various bodies with silken threads, the source of which is contained in internal reservoirs similar to those of Caterpillars, and that are also produced by fusi situated in the lip. The interior of the habitation forms a tube which is open at both ends for the intromission of water. The larva always transports its domicil along with it, protrudes the anterior extremity of its body while progressing, never quits its dwelling, and when found to do so, returns to it voluntarily when left within its reach.

These larvæ are elongated and almost cylindrical; their head is squamous and furnished with stout mandibles and a little eye on each side; they have six feet, the two anterior shorter and usually thicker than the others which are elongated. Their body is composed of twelve rings, the fourth of which is furnished on each side with a conical mammilla; the last is terminated by two movable hooks. In most of them we also observe two ranges of white membranous and extremely flexible threads which seem to be organs of respiration.

When about to become nymphs, they fix their tubes to different bodies, but always in water, and close the two orifices with a grating, the form of which, as well as that of the tube itself, varies according to the species.

In fixing their portable dwelling, they so manage it that the aperture, which is at the point d'appui, is never obstructed.

The nymph is furnished anteriorly with two hooks, which cross each other and somewhat resemble a rostrum or snout. With it, when the period of its last metamorphosis has arrived, it perforates one of the grated septa in order to procure egress.

Hitherto immovable, it now walks or swims with agility, by means of its four anterior feet, which are free, and furnished with thick fringes of hairs. The nymphs of the large species leave the water altogether, and climb on various bodies, where their final change is effected. The small ones simply rise to the surface, where they are transformed to winged Insects, in the manner of the Culices and various Tipulariæ; their exuvium serves them for a boat.

In some the inferior wings are evidently wider than the others, and plaited.

Sericostoma, Lat.

Where, in one of the sexes, the maxillary palpi are in the form of valvulæ, covering the mouth in the manner of a rounded snout, and triarticulated; under them is a thick and cotton-like down. Those of the other sex are filiform, and consist of five joints(1).

Phryganea proper.

Where the mouth is similar in both sexes, and the maxillary palpi are shorter than the head and thorax, and but scarcely pilose.

P. grandis; Rœs.; Insect., II, Ins. Aq. cl, 2, xvii. The largest species in France; antennæ as long as the body; superior wings greyish-brown, with cinereous spots, a longitudinal black stripe, and two or three white dots at their extremity.

The tube of its larva is invested with little pieces of bark, or ligneous matters arranged horizontally.

P. striata, L.; Geoff., Insect., II, xiii, 5. About an inch long; fulvous; eyes black; nervures somewhat darker than the rest of the wing.

P. rhombica; Rœs., Insect., II, Ins. Aq., cl, 2, xvi. Length seven lines and of a brown yellow; a large, white, rhomboïdal, and lateral spot on the superior wings.

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(1) A genus established on a species from the environs of Aix, sent to me by M. Boyer de Fons-Colombe, and which has been also brought from the Levant by M. de Labillardière.

The tube of its larva is covered with little stones and fragments of shells(1).

Certain species, such as the *filosa*, *quadrifasciata*, *longicornis*, *hirta*, *nigra*, have excessively long antennæ, and maxillary palpi also extremely long and densely pilose. They form the subgenus

MYSTACIDA, Lat.

In the others the four wings are narrow, lanceolate, almost equal, and without plicæ. To this division belongs the

HYDROPTILA, Dalm.

Where the antennæ are short, almost granose, and of equal thickness(2).

Another subgenus—*Psychomyia*—might be formed of Phryganeæ with similar wings, but in which the antennæ are long and setaceous, as in almost all the others. We frequently observe in the gardens of France, on the leaves of various shrubs, a very small and active species, the body of which is fulvous brown, and the antennæ annulated with white; it appears to me to be new or imperfectly described.

ORDER IX.

HYMENOPTERA(3).

In this family we still find four membranoûs and naked wings, and a mouth composed of mandibles, maxillæ and two lips; but these wings, of which the superior are always largest, have fewer nervures than those of the Neuroptera, and are not veined; the abdomen of the females is terminated by an ovipositor or sting.

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(1) For the other species, see Fabricius, De Geer and Rœsel.

(2) Anal. Entom., p. 26.

(3) The *Piezata*, Fab.

Besides their compound eyes they are all provided with three small simple ones. Their antennæ vary, not only according to the genus, but even in the sexes of the same species; generally, however, they are filiform or setaceous. The maxillæ and labium are usually narrow, elongated, and fixed in a deep cavity of the head by long muscles(1), form a semitube inferiorly, are frequently folded up at their extremity, and better adapted for the transmission of nutritious fluids than for mastication; in several they form a proboscis. The ligula is membranous, either widened at its extremity, or long and filiform, having the pharynx at its anterior base, and being frequently covered by a sort of sub-labrum or epipharynx. They have four palpi, two maxillary and two labial. The thorax consists of three united segments, of which the anterior is very short and the two last are confounded in one(2). The wings are laid horizontally on the body. The abdomen is most commonly suspended by a little thread or pedicle to the posterior extremity of the thorax. The tarsi consist of five entire joints, none of them being divided. The ovipositor and sting(3) are generally composed of three long and slender pieces, two of which serve as a sheath to the third in those which are provided with an ovipositor, and one alone, the superior, has a groove underneath for lodging the two others. In those where this ovipositor is transformed into a sting, this offensive weapon and the oviduct are serrated at the extremity.

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(1) The mentum, here, participates in this general motion, while in the other triturating Insects it is fixed and immovable.

(2) The metathorax, properly so called, is very short, forms but a simple superior hoop, and is intimately united with the first segment of the abdomen, so that in truth, the thorax, viewed from above, is composed of four segments, the second and last of which are the largest; in a great number, the latter presents two very distinct stigmata. When the abdomen is pediculated, its second segment, always supposing the preceding one to belong to it, is apparently the first.

(3) Both are formed on the same model. From the middle of the posterior and inferior extremity of the abdomen, proceed two laminæ, each composed of two pieces, sometimes valvular and serving as a sheath, and sometimes in the form of a stylet or of palpi. Between them are two other pieces united in one, which compose the ovipositor or sting. When they form a sting, the superior receives the other in an inferior canal or groove. In the Tenthredinetæ, the ovipositor consists of two pieces, resembling blades of knives, applied one against the other by the side; they are striated transversely, and dentated along the margin.

M. Jurine has discovered good auxiliary characters for the distinction of genera, in the articulation of the wings(1); to describe them, however, would not be in unison with the nature of this work, and could not remove the necessity of referring to his. We will merely observe that he chiefly employs those resulting from the presence or absence, number, form and connexion of two sorts of cells situated near the external margin of the superior wings, which he styles *radial* and *cubital*. The middle of this margin most commonly presents a little callosity called the *wrist* or *carpus*. From the latter arises a nervure, which running towards the extremity of the wing, forms, in conjunction with this margin, the cell named *radial*, that is sometimes divided into two. Near this spot arises a second nervure, which also proceeds to the posterior margin, leaving a space between it and the preceding one—this space is that of the *cubital* cells, the number of which varies from one to four(2).

The Hymenoptera undergo a complete metamorphosis. Most of their larvæ resemble worms and are destitute of feet; such, for instance, are those of our second and following families. Those of the first have six hooked feet, and frequently from twelve to sixteen others that are simply membranous. These latter have been named pseudo-caterpillars. Both kinds have a squamous head provided with mandibles, maxillæ, and a lip; at the extremity of the latter is a fusus for the transmission of the silky material that is to be employed in constructing the cocoon of the nymph.

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(1) Nouv. Méth. de class. les Hymen. et les Dipt.

(2) See Encyc. Méthod., article *Radiale*, where this method is well described and perfected. Jurine has also published an excellent work on the organization of the wings in the Hymenoptera, in the Mem. Ac. Sc. Tur. We are also indebted to M. Chabrier, for his researches on this matter; they are, however, more general in their application. They are inserted in the Mém. du Mus. d'Hist. Nat.

Some feed on vegetable substances, while others, always destitute of feet, devour the carcases of Insects together with their larvæ, nymphs, and even eggs.

To remedy their want of locomotive powers, the mother furnishes them with provisions, sometimes by transporting aliment into the nests she has prepared for them, which are frequently constructed with so much art as to excite our wonder and surprise, and sometimes by depositing her eggs in the body of the larvæ and nymphs of Insects, on which her progeny are to feed.

Other larvæ of Hymenoptera, also destitute of feet, require more elaborated and frequently renewed supplies of aliment, both vegetable and animal. These are reared in common by neuters forming communities, of which they have the sole care; their labours and mode of life will always continue to excite our admiration and astonishment.

Almost all Hymenopterous Insects, in their perfect state, live on flowers and are usually most abundant in southern climates. Their period of life, from their birth to their ultimate metamorphosis, is limited to a year.

M. Leon Dufour in his *Memoire sur l'Anatomie des Scolies*—Journ. de Phys., Sept. 1828—remarks, that in all the Hymenoptera submitted to his scalpel, the tracheæ are a degree more perfect than those of the other orders of Insects; that instead of being formed by cylindrical and elastic vessels, the diameter of which decreases by their successive divisions, they present constant dilatations, decided vesicles favourable to the greater or less permanence of air, and susceptible of extension and diminution, according to the quantity of that fluid admitted. On each side of the base of the abdomen may be found one of these vesicles; it is large, oval, and of a dead lacteous-white, giving off here and there vascular tracheæ which are distributed among the adjacent organs. In penetrating into the thorax it is strangulated, dilates again, and insensibly degenerates into a tube, the subdivisions of which are lost in the head. Behind these two abdominal vesicles, the organ of respiration continues on in two filiform tubes, giving off an infinity of ramous branches, and becoming confluent near the anus. In the Xylocopæ and Bombi, the anterior superior surface of each of the two great abdominal vesicles is furnished with a cylindrical, elastic, greyish body, but adhering throughout its length in the Xylocopæ, and free in the Bombi. M. Dufour thinks that this body, which is directed towards the insertion of the wing, has some part in the production of the humming noise made by these Insects, inasmuch as that sound may continue after the wings have been taken off.

I will divide this order into two sections.

The first, or that of the TEREBRANTIA, is characterized by the presence of an ovipositor in the females.

I divide this section into two great families.

FAMILY I.

SECURIFERA.

Our first family is distinguished from the following ones by a sessile abdomen, or the base of which is joined to the thorax throughout its whole thickness, that seems to be a continuation of it and to have no separate motion(1).

The females are provided with an ovipositor that is most commonly serrated, and which not only enables them to deposit their eggs, but likewise to prepare a place for their reception. The larvæ always have six squamous feet, and frequently others that are membranous.

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(1) The segment, bearing the inferior wings, is separated from the following one or the first of the abdomen, by a transverse incisure or articulation. The other segments then follow uninterruptedly, and without any particular strangulation.

This family is composed of two tribes.

In the first, that of the TENTHREDINETÆ, Lat., vulgarly termed *Mouches-a-scie*, or *Saw-flies*, we observe elongated and compressed mandibles; a trifid or sort of digitated ligula; an ovipositor formed of two serrated, pointed blades, united and lodged in a groove under the anus. The maxillary palpi are all composed of six joints, and the labials of four; the latter are always the shortest. The wings are always divided into numerous cells. This tribe forms the genus

TENTHREDO, Lin.

The cylindrical abdomen of these Insects which is rounded posteriorly, composed of nine annuli, and so closely joined to the thorax that the two seem to be continuous; the ragged appearance of their wings; the two little rounded, granular, and usually coloured bodies situated behind the scutellum, together with their heavy port, cause them to be easily recognized. The form and composition of the antennæ vary. Their mandibles are strong and dentated. The extremity of their maxillæ is almost membranous, or less coriaceous than their stem. Their palpi are filiform or nearly setaceous, and consist of six joints. The ligula is straight, rounded, and divided into three doubled portions, the intermediate of which is the narrowest; its sheath is usually short, and its palpi, shorter than the maxillaries, consist of four joints, the last almost bordering on an oval. The abdomen of the female presents at its inferior extremity a double, movable, squamous ovipositor that is serrated, pointed, and lodged between two concave laminæ, forming its sheath or case.

It is by the alternate action of the teeth of this ovipositor, that the Insect makes a number of little holes in the branches, and various other parts of trees and plants, in each of which it first deposits an egg, and then a foaming liquid, the use of which, it is presumed, is to prevent the aperture from closing. The wounds made in this way become more and more convex by the increasing size of the egg. Sometimes these excrescences assume the form of a gall-nut, either ligneous or soft and pulpy, or resemble a little fruit, according to the nature of the parts of the plant that are affected by them. These tumours then form the domicil of the larvæ which inhabit them either solitarily or in society. There they undergo their metamorphosis, and issue from them through a circular opening made in their parietes by the teeth of the Insect. Generally speaking, however, these larvæ live exposed on the leaves of the trees and plants on which they feed. In the general form of the body, its colours, the exterior disposition of its dermis, and in the great number of feet these larvæ closely resemble caterpillars, and have been called *false*, or *pseudo-caterpillars:* but they are distinguished from the latter by having from eighteen to twenty-two feet, the number of these organs in the caterpillar being from ten to sixteen. Several of these pseudo-caterpillars roll themselves up spirally; in others the posterior portion of the body is arched. In order to become nymphs they spin a cocoon, either in the earth, or on the plants where they have lived. There they pass several consecutive months, or even the whole winter, in their first state, and only pass into that of a nymph a few days previous to the one in which they appear as perfect Insects or Saw-flies.

M. Dutrochet, corresponding member of the Académie des Sciences, has published some observations on the alimentary canal of these Insects in the Journal Physique.

In some, where the antennæ in several consist of but nine joints, and where the internal extremity of the two anterior tibiæ is furnished with two straight and divergent spines, the ovipositor does not project posteriorly.

Here the labrum is always apparent, and the middle of the inner side of the four posterior tibiæ is destitute of spines, or presents but one. The larvæ or pseudo-caterpillars have from twelve to sixteen membranous feet.

The antennæ, always short, sometimes terminate either in a thick inflation in the form of a reversed cone rounded at the extremity, or of a button, or in a large joint forming an elongated, prismatic or cylindrical club forked in some males; the number of the preceding joints is five at most.

Those species, in which these organs, similar in both sexes, are terminated by a globuliform inflation, or by one resembling a reversed cone rounded at the extremity(1), and preceded by from four to five joints, and where the two nervures of the superior wings forming the rib, as far as the callous point, are contiguous, or closely approximated and parallel, without a wide intermediate sulcus, form the genus

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(1) This inflation is formed by the fifth or sixth joint, but which, in several, presents vestiges of two or three annular divisions.

CIMBEX, Oliv. Fab.—*Crabro*, Geoff.

The larvæ have but twenty-two feet. Some of them when irritated spurt a greenish liquor from the sides of their body to the distance of a foot.

Dr Leach(1), by having recourse to the number of joints anterior to the club, their relative proportions and the arrangement of the cells of the wings, has divided the genus Cimbex into several others, one of which, PERGA(2), is peculiar to New Holland, and is distinguished from all the others by the following characters. The four posterior tibiæ have a movable spine on the middle of their inferior side. The scutellum is large and square, with its posterior angles projecting in the form of teeth. The valves that sheathe the ovipositor are covered externally with numerous short and frizzled hairs. The antennæ are very short and have six joints, the last of which, or the club, is without any vestiges of annuli as in SYZYGONIA, a genus established by Klüg on some species from Brazil(3). The radial cell is appendiculated, and there are four cubital cells, the second and third of which receive, each, a recurrent nervure—the transverse nervures of the disk.

M. Lepeletier de St Fargeau, in an excellent Monograph of the Tenthredinetæ, only adopts the genus *Perga*, and in conjunction with him we will consider those of the English naturalist as simple divisions of Cimbex.

The two following species belong to that number in which the antennæ have five joints before the club.

C. lutea; *Tenthredo lutea*, L.; De Geer, Insect., II, xxxiii, 8—16. About an inch in length; brown; antennæ yellow; abdomen yellow, with violet-black bands.

The larva, or pseudo-caterpillar, is of a deep yellow, with a blue stripe, edged with black along the back. On the Willow, Birch, &c.

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(1) Zool. Miscel., III, p. 100, et seq.

(2) Ibid., 116, cxlviii; Lepel., Monog. Tenthred., p. 40.

(3) Monog. Entom., p. 177; in the same work, p. 171, he gives the characters of another genus *Pachylosticta*, also peculiar to Brazil. The antennæ consist of five joints. The superior wings are dilated near their extremity, and the callous point is semilunar. The second, third and fourth joints of the posterior tarsi are very short. He mentions three species.

The genus Perga, on account of the cells of the wings and the spines of the posterior tibia, should come directly before Hylotoma.

C. femorata; Tenthredo femorata, L.; De Geer, Insect., II, xxxiv, 1—6. Large; black; antennæ and ovipositor of a brown-yellow; blackish-brown spots on the posterior margin of the superior wings; posterior thighs very large, in one of the sexes at least.

The larva lives also on the Willow; it is green, with three stripes on the back, that in the middle bluish and those on the sides yellowish(1).

Those species, in which the antennæ present but three very distinct joints, the last of which forms an elongated, prismatic or cylindrical club, more slender, ciliated and sometimes forked in the males; and where the two costal nervures of the superior wings are very remote from each other, constitute the subgenus

HYLOTOMA, Lat. Fab.—*Cryptus*, Jur.

Some—SCHYZOCERA, Lat.; *Cryptus*, Leach, Lepel.—have four cubical cells, and the antennæ forked in the males. The middle of the tibiæ is destitute of spines(2).

Others—Hylotoma properly so called—similar to the preceding in their wings, have their antennæ terminated in both sexes by a simple or undivided joint. Most of them—*Hylotomes*, Lepel.—have a spine in the middle of the four posterior tibiæ. The larvæ or pseudo-caterpillars have from eighteen to twenty feet.

H. rosæ; Tenthredo rosæ, L.; Rœs., Insect., II, Vesp., II. Four lines in length; head, top of the thorax, and exterior margin of the superior wings, black; remainder of the body saffron-yellow; tarsi annulated with black.

The larva is yellow, dotted with black; it gnaws the leaves of the Rose-tree.

M. Lepeletier reunites to the *Cryptus*, Leach, certain species which only differ from the preceding ones in the absence of spines on the middle of the four posterior tibiæ.

Other *Hylotomæ*, distinguished by the same negative character, but which have but three cubital cells, form his genus *Ptilia*(3).

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(1) For the other species, see Oliv., Encyc. Méthod., article *Cimbex*; Fab.; Lat., Gen. Crust. et Insect., III, p. 227; Jurine, genus *Tenthredo*; Panz., Hymen.; and the works already quoted.

(2) Leach, Zool. Miscell., III, p. 124; Lepel., Monog., Tenthred., p. 52.

(3) Lepel., Ib., p. 49. For the other species of Hylotomæ, see the same work, the preceding one of Dr Leach, and the Monograph of the various genera of this family by Klüg.

Sometimes the antennæ have at least nine very distinct joints, and do not terminate suddenly in a club.

In some, and the greater number, the antennæ, always simple in both sexes, or at least in the females, have fourteen joints at most, and commonly but nine.

TENTHREDO, Lat. Fab.

Or Tenthredo proper, where the antennæ consist of nine simple joints in both sexes.

The larvæ have from eighteen to twenty-two feet.

The number of dentations in the mandibles of the perfect Insect varies from two to four. The superior wings also differ in the number of their radial and cubital cells. These characters have been used to establish several other subgenera, which we will unite with the present one. They are composed of the *Allantes*, *Doleres*, *Nemetes*, &c. of Jurine, and of the *Pristophose*, formed of the third family of the Pterones of that naturalist, with some others of Dr Leach.

T. scrophulariæ, L.; Panz., Faun. Insect., Germ., C, 10, the male. Five lines in length; black; antennæ fulvous and somewhat thickest at the extremity; annuli of the abdomen, the second and third excepted, margined posteriorly with yellow; tibiæ and tarsi fulvous. It resembles a Wasp.

The larva has twenty-two feet; white, with black head and points. It feeds on the leaves of the Scrophulariæ.

T. viridis, L.; Panz., Faun. Insect. Germ., LXIV, 2. The same length; antennæ setaceous; body green; spots on the thorax and a band along the middle of the superior part of the abdomen, black. On the Birch(1).

De Geer has given us the description of a very singular species in its form of a larva, that which he calls *Mouche-à-scie* of the *larve-limace*, and to which he refers the *Tenthredo cerasi*, L. It is black, with blackish wings and brown feet. The larva is extremely common on the leaves of various fruit-trees in the gardens of France. On account of its form, Reaumur called it *Fausse Chemille Têtard*. It is entirely black, and covered with a glutinous humour, which has also caused it to be compared to a Snail.

M. Peck, an American botanist, has also furnished us with the complete history of another species, the larva of which is similar.

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(1) For the other species, see the authors just quoted.

Others, in which the antennæ also consist of nine joints, differ from the preceding in those of the males which are pectinated on one side.

Cladius, Klüg, Lat.(1)

Some others, with a short, thick body, like that of the Hylotomæ, and considered as such by Fabricius, have from ten to fourteen joints in the antennæ, which are simple in both sexes.

Athalia, Leach(2).

The following species are remarkable for their antennæ, which are composed of sixteen joints at least, pectinated or flabelliform in the males, and serrated in the females. In this respect they lead us to the Megalodontes, the first subgenus of the ensuing subdivision.

Pterygophorus, Klüg.

Where the antennæ have but a single range of teeth, and simply longer or pectinated in the males, and short and serrated in the females; here they are evidently enlarged at the extremity(3).

Lophyrus, Lat.

Where the antennæ, in the males, have a double range of elongated teeth forming a large triangular panache, and are serrated in the females.

To this subgenus I refer the first family of the *Pterones* of M. Jurine, as well as the first division of the *Hylotomæ* of Fabricius. The larvæ or pseudo-caterpillars live in society, more particularly on the Pines. They are very injurious to the young plants(4).

There, the labrum is concealed or but slightly salient. The inner side of the four posterior tibiæ, anterior to its extremity, presents two spines, and frequently even a third above the preceding pair.

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(1) Lepel., Ibid., p. 57.

(2) Lepel., Ibid., p. 21. In this genus, Dr Leach only comprises those species which are furnished with ten joints. Klüg arranges them among his *Emphyti*.

(3) See Klüg, Leach and Lepeletier, Ibid.

(4) Lepelet., Ibid., and the Monog. of this subgenus, published by Klüg, in the Mem. Nat. Cur. of Berlin.

The antennæ are always multiarticulated, the head is large, square, placed on a little neck, and has strongly crossed mandibles. They appear in spring.

The larvæ of the greater number are destitute of membranous feet, and inhabit silken nests of their own spinning, formed round the leaves of various trees.

They constitute the genus *Cephaleia* of Jurine, which has been divided into two.

Megalodontes, Lat.—*Tarpa*, Fab.

Where the antennæ are serrated or pectiniform(1).

Pamphilius, Lat.—*Lyda*, Fab.

Where those organs are simple in both sexes.

Their larvæ are destitute of membranous feet, and the posterior extremity of their body is terminated by two horns. They feed on leaves, which they frequently double in order to remain concealed(2).

In the last of the Tenthredinetæ, the ovipositor is prolonged beyond its groove and projects posteriorly. The inner extremity of the two anterior tibiæ presents distinctly but a single spine, curved and terminated by two teeth. The antennæ are always composed of a great number of simple joints.

Xyela, Dalm.—*Pinicola*, Bréb.—*Mastigocerus*, Klüg.

The Xyelæ are very distinct by their geniculate antennæ forming a sort of whip, that are abruptly attenuated near their extremity, and consist of eleven joints, the third of which is very long; as well as by their very long and equally flagelliform maxillary palpi. The thick or callous point of the superior wings is replaced by a cell. The laminæ of the ovipositor are smooth and entire.

The larvæ inhabit the interior of plants or old wood(3).

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(1) See the preceding works, and the Entom. Monog., Klüg, p. 183.

(2) Ibid. Encyc. Méthod., article *Pamphilie*, and the Monograph of the genus *Lyda* of Klüg, in the Mem. Nat. Cur. of Berlin. See also the Monograph of M. Lepeletier.

(3) See Dalm., Anal. Entom., p. 27. The number of joints is the same as in the preceding Insects, and in this respect, that naturalist is mistaken. See also the Nouv. Dict. d'Hist. Nat., 2d edit., article *Pinicole*, and the Monograph of the Tenthredinitæ of M. Lepeletier.

CEPHUS, Lat. Fab.—*Trachelus*, Jur.

Where the antennæ are thickest near the end, and inserted near the front. According to certain observations published in the Bullet. Univers., of Baron Férussac, the larva of the most common species—*pygmæus*—lives in the interior of the stems of the wheat(1).

XIPHYDRIA, Lat. Fab.—*Urocerus*, Jur.

Where the antennæ are inserted near the mouth, and more attenuated towards the extremity(2).

The second tribe, that of the UROCERATA, Lat., is distinguished from the preceding one by the following characters: the mandibles are short and thick; the ligula is entire; the ovipositor of the females is sometimes very salient and composed of three threads, and sometimes capillary and spirally convoluted in the interior of the abdomen.

This tribe is composed of the genus

SIREX, Lin.

The antennæ are filiform or setaceous, vibratile, and formed by from ten to twenty-five joints. The head is rounded and almost globular; the labrum very small; the maxillary palpi are filiform with from two to five joints, and the labials with three, the last of which is the thickest. The body is almost cylindrical. The anterior or posterior tarsi, and in several the colour of the abdomen, differ according to the sex. The female deposits her eggs in old trees, most commonly in Pines. Her ovipositor is lodged at base between two valves, forming a groove.

ORYSSUS, Lat. Fab.

Where the antennæ are inserted near the mouth and consist of ten or eleven joints. The mandibles are edentated, and the maxillary palpi long and formed of five joints; the posterior extremity of the abdomen is almost rounded or but slightly prolonged, and the ovipositor capillary and spirally convoluted in the interior of the abdomen.

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(1) See the work already quoted, and the Monog. of the genus SIREX of Klüg, G. *Astatus*.

(2) Ibid., and Jurine. Klüg designates this genus by the name of *Hybonotus*.

The two species known are found in Europe, on the trees only, in the spring. They are very active(1).

Sirex, Lin.—*Urocerus*, Geoff.,

Or Sirex proper, where the antennæ are inserted near the front and consist of from thirteen to twenty-five joints. The mandibles are dentated on the inner side, and the maxillary palpi very small, almost conical, and biarticulated. The extremity of the last segment of the abdomen is prolonged into a sort of tail or horn, and the ovipositor is salient and formed of three filaments.

These Insects, which are tolerably large, more particularly inhabit the Pine forests of cold and mountainous countries, produce in flying a humming like that of a Bombus, &c., and in certain seasons have appeared in such numbers as to strike the people with terror.

The larva has six feet, and the posterior extremity of its body terminates in a point. It lives in wood, where it spins a cocoon, and completes its metamorphosis.

S. gigas, L., the female—*S. mariscus*, L., the male; Rœs., Insect., II, Vesp., viii, ix. The female is above an inch in length and black, with a spot behind each eye; the second ring of the abdomen and the three last, yellow. The abdomen of the female is fulvous-yellowish with a black extremity.

The *Tremex* of Jurine only differs from Sirex in the antennæ, which are shorter, less slender at the end, or filiform only, consisting of thirteen or fourteen joints, and in the superior wings which have but two cubital cells(2).

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(1) See Lat., Gen. Crust. et Insect., III, p. 245, and Encyc. Méthod., article *Orysse*.

(2) See Lat., Ibid., III, p. 238; the Monograph of this genus by Klüg; the work of Jurine and that of Panzer on the *Hymenoptera*.

FAMILY II.

PUPIVORA.

In the second family of the Hymenoptera we find the abdomen attached to the thorax by a simple portion of its transversal diameter, and even most frequently by a very small thread or pedicle, in such a manner that its insertion is very distinct, and that it moves on that part of the body(1). The females are provided with an ovipositor.

The larvæ are destitute of feet and mostly parasitical and carnivorous.

I divide this family into six tribes.

In the first, that of the EVANIALES, Lat., the wings are veined, and the superior ones, at least, are lobate; the antennæ filiform or setaceous, and composed of thirteen or fourteen joints; the mandibles dentated on the inner side; the maxillary palpi composed of six joints, and the labials of four. The abdomen is implanted on the thorax, in several under the scutellum, and has an ovipositor usually salient and formed of three filaments.

This tribe appears to form but the single genus

FŒNUS.

Sometimes the ovipositor is concealed, or but very slightly salient, and resembles a little sting. The ligula is trifid, a character which approximates these Insects to the preceding Hymenoptera.

EVANIA, Fab.—*Sphex*, Lin.

Where the antennæ are geniculate, and the very small, compressed, triangular or ovoid abdomen, abruptly pediculated at its origin, is inserted into the posterior and superior extremity of the thorax, under the scutellum(1).

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(1) The first segment of the abdomen forms the posterior extremity of the thorax, and unites intimately with the metathorax, so that the second segment of the abdomen becomes the first.

PELECINUS, Lat. Fab.

Where the abdomen, as in the following subgenus, inserted much lower, a little above the origin of the posterior legs, is elongated, sometimes filiform, very long and arcuated, and sometimes gradually narrowed towards its base and terminated like a club. The posterior tibiæ are inflated. The antennæ are straight and very small(2).

Sometimes the ovipositor projects greatly and is formed of three distinct and equal threads.

In some, the abdomen and posterior tibiæ are clavate; the antennæ are filiform, and the ligula is entire or simply emarginated. Such is Fœnus proper, or

FŒNUS, Fab.—*Ichneumon*, Lin.(3)

The abdomen of the others is compressed, ellipsoidal, or falciform, and all their tibiæ are slender. The antennæ are setaceous.

AULACUS, Jur. Spin.

Where the abdomen is ellipsoidal(4).

PAXYLLOMA, Bréb.

Where the abdomen is falciform(5).

In the second tribe, that of the ICHNEUMONIDES, the wings are also veined, the superior ones always presenting complete or closed cells in their disk. The abdomen originates between the two posterior legs. The antennæ are generally filiform or setaceous, rarely clavate, vibratile, and multiarticulated, being composed of sixteen joints at least. In most of them the mandibles have no tooth on the inner side, and terminate in a bifid point. The maxillary palpi, always apparent or salient, consist most commonly of but five joints. The ovipositor is formed of three threads.

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(1) See Fab., Jur., Lat., Gen. Crust. et Insect., III, p. 250.

(2) See the works already quoted, and Encyc. Méthod., article *Pelecine*.

(3) See Jurine, Hymenopt.; Lat., Gener., Crust. et Insect., IV, 3; and Panzer on the Hymenoptera. See also Spinol., Insect. Ligur.

(4) Idem.

(5) See the Nouv. Dict. d'Hist. Nat. 2d edit.; a subgenus formed on a single species closely allied to the Ophion, Fab.

This tribe embraces almost the whole genus

ICHNEUMON, Lin.(1)

These Insects destroy the posterity of the Lepidoptera, so noxious to the agriculturalist under the form of caterpillars, just as the quadruped so called is said to destroy that of the Crocodile by breaking its eggs, and even by introducing itself into the body of the animal in order to devour its entrails.

Some authors have called them *Mouches tripiles*, on account of the three setæ which compose their ovipositor, and *Mouches vibrantes*, because their antennæ are continually vibrating. These organs are frequently curled (contournées), and have a white or yellowish annular spot in the middle. Their maxillary palpi are elongated, almost setaceous, and consist of from five to six joints; the labials are shorter, filiform, and have but from three to four joints. The ligula is usually entire or simply emarginated. The body is most frequently narrow and elongated or linear, with the ovipositor sometimes exterior and resembling a tail, and sometimes very short and concealed in the interior of the abdomen, which then terminates in a point, whilst in those where the ovipositor is salient it is thicker, and as if clavate and truncated posteriorly. Of the three pieces which compose this instrument the intermediate is the only one that penetrates into the bodies in which these Insects deposit their eggs; its extremity is flattened, and sometimes resembles the nib of a pen.

The females, anxious to lay, are continually flying or walking about(2), in order to discover the larvæ, nymphs, and eggs of Insects, and even Spiders, Aphides, &c., destined to receive their ova, and when hatched, to sustain their offspring. In this search they exhibit a wonderful degree of instinct, which reveals to them the most secret retreats of its objects. Those which are provided with a long ovipositor deposit the germs of their race in the fissures or holes of trees, or under their bark. In this operation the ovipositor proper is introduced almost perpendicularly, and is completely disengaged from its semi-scabbards, which remain parallel to each other, and supported in the air, in the line of the body. Those females in which the ovipositor is very short, and but slightly or not at all apparent, deposit their ova in the body of larvæ, caterpillars, and nymphs, which are exposed or very accessible.

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(1) This genus comprises *upwards of twelve hundred species*, and its study is extremely difficult. The labours of MM. Gravenhorst and Nées de Esenbeck have rendered it somewhat easier. The former of these gentlemen has lately published the prospectus of a complete work on these Insects, and we have every reason to believe that this interesting portion of entomology will be henceforward as well understood as the state of the science will allow.

(2) Some species are apterous or have but very short wings. They are the subject of a particular Monograph published by M. Gravenhorst, who has also favoured us with another on the Ichneumons of Piemont.

The larvæ of the Ichneumonides, like all the others of the succeeding families, are destitute of feet. Those which, in the manner of intestinal worms, inhabit the bodies of larvæ or caterpillars, where they sometimes form communities, only attack the adipose substance—corps graisseux—or such of the internal parts as are not necessary to their existence. When about to become nymphs, however, they perforate their skin in order to open a passage, or put them to death, and there tranquilly undergo their ultimate metamorphosis. Such also are the habits of those which feed on nymphs or chrysalides. Nearly all of them spin a silken cocoon, in which they become nymphs. These cocoons are sometimes agglomerated, either naked, or enveloped in a sort of tow or cotton, in an oval mass, frequently found attached to the stems of plants. The symmetrical arrangement of the cocoons of one species forms an alveolar body, resembling the honeycomb of our domestic Bee. The silk of these cocoons is sometimes of a uniform yellow or white, and sometimes mixed with black or filaments of two colours. Those of some species are suspended to a leaf or twig, by means of a long thread. Reaumur has observed that when detached from the bodies to which they are fixed, they make repeated jumps to about the height of four inches, the larva enclosed in the cocoon approximating the two extremities of its body, and then suddenly returning to a straight line in the manner of various skipping larvæ of Dipterous Insects, found on old cheese. This family is extremely rich in species.

The difference in the number of joints, found in the palpi, may serve as a basis of three principal divisions.

The first will comprise those species in which the maxillary palpi have five joints, and the labials four. The second cubital cell is very small, and almost circular or null.

We will form a first subdivision with those in which the head is never prolonged anteriorly in the form of a snout or rostrum, in which the ligula is not deeply emarginated, and in which the maxillary palpi are much elongated, their last joints, in form and proportion, differing evidently from the preceding ones. The ovipositor is not covered at base by a large lamina in the form of a vomer.

Here, this ovipositor is extremely salient.

Some species are distinguished from the others by their almost globular head, their mandibles terminated in an entire or but slightly emarginated point, and by the elongation of their metathorax. The second cubital cell is frequently wanting. Such are those which form the

STEPHANUS, Jur.—*Pimpla*, *Bracon*, Fab.

Where the thorax is much thinned anteriorly, and on a level at its posterior extremity with the origin of the abdomen, so that this part of the body appears almost sessile and inserted in the posterior and superior extremity of the thorax as in the Evaniæ. The posterior thighs are inflated, and several little tubercles are observable on the vertex(1).

XORIDES, Lat.—*Pimpla*, *Cryptus*, Fab.

Where the metathorax is convex and rounded at its descent, so that the abdomen is inserted, as usual, at its inferior extremity, and presents a very distinct pedicle(2).

Of those species in which the head is transverse, and the mandibles are very distinctly bifid or well emarginated at the point, some, such as form the

PIMPLA, Fab.,

Have a cylindrical and very briefly pediculated abdomen. We will cite the

P. persuasoria; *Ichneumon persuasorius*, L.; Panz., Faun. Insect. Germ., xix, 18. One of the largest species in Europe; black; spots on the thorax and the scutellum white; two white dots on each ring of the abdomen; legs fulvous; ovipositor as long as the body.

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(1) Lat., Gener. Crust. et Insect., IX, 3; *Bracon serrator*, Fab.;—*Pimpla coronator*, Fab., and some other undescribed species from America.

(2) Lat., Gener. Crust. et Insect., IX, 4. The *Pimpla mediator*, *necator* and *meliorator*, Fab., are probably Xorides; his *Cryptus ruspator* should apparently form a separate subgenus, allied to the preceding one.

P. manifestator; *Ichneumon manifestator*, L.; Panz., Ibid., xix, 21. Black; scutellum of the same colour; legs fulvous. The

P. ovivora, Bullet. Univers. des Sc., of the Baron Férussac destroys the eggs of Spiders(1).

In others the abdomen almost borders on an oval, and has an elongated, slender and arcuated pedicle. They form the

Cryptus, Fab.

Some species are known in which the females are apterous, and which by reason of this character and the form of the thorax, that is divided into two parts or knots, might constitute a separate subgenus. They are almost always found on the ground(2).

There, the ovipositor of the females is concealed or but slightly prolonged beyond the anus.

Sometimes the abdomen is compressed and falciform, or clavate and truncated.

Ophion, Fab.

Where the antennæ are filiform or setaceous, and where the abdomen is falciform and truncated at the extremity. The ovipositor is somewhat salient. The second cubital cell is very small or null.

O. luteus; *Ichneumon luteus*, L.; Schæff., Icon. Insect., I, 10. Russet-yellow with green eyes.

The female deposits her ova on the skin of certain caterpillars, particularly on that called in France the *queue-fourchue*—*Bombyx vinula*. They are attached to it by means of a long and slender pedicle. There the larvæ live and grow, with the posterior extremity of their body involved in the pellicle of the eggs from which they sprung, without preventing the Caterpillar from spinning its cocoon; but they finally kill it by consuming its internal substance, when they make their own cocoons, which are placed close together, and at length issue forth under the form of Ichneumons.

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(1) Fab., Syst. Piez.; and Encyc. Méthod., article *Pimpla*.
(2) Fab., Ibid.

The larva of another species, the *O. moderator*, Fab., destroys that of another Ichneumon, the *Pimpla strobilellæ*, Fab.(1)

BANCHUS, Fab.

Similar as to the antennæ, but the abdomen of the females is narrowed at the end and terminated in a point(2).

HELWIGIA.

The port of the preceding Insects, but the antennæ thicker near the extremity(3).

Sometimes the abdomen is rather flattened than compressed, being either somewhat oval, or almost cylindrical, or fusiform.

In these, the abdomen is considerably narrowed at base in the manner of a pedicle.

JOPPA, Fab.

The Joppæ are removed from the following subgenera by their antennæ, which are widened or thickened anterior to the extremity, and then terminate in a point(4).

ICHNEUMON proper.

Where the head is transversal and the abdomen somewhat oval, and almost equally narrowed at both ends.

Panzer has separated generically, under the name of *Trogus*, those species in which the scutellum forms a conical tubercle, and the abdomen presents deep transversal incisures(5).

ALOMYA, Fab.

Where the head is narrower and more rounded, with the abdomen more widened near its posterior extremity.

An Ichneumon inhabiting France, and which appears to us nearly allied to the *femoralis* of Gravenhorst—Ichn. Pedem.,

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(1) Fab., Syst. Piez.; and Encyc. Méthod., article *Ophion*.

(2) Fab., Ibid.

(3) See the Bullet. Univers. des Sc. of Baron Férussac.

(4) Fab., Syst. Piez.

(5) Fab., Ibid., and Panz. Hymenopt.

No. 136—and otherwise closely approximated to the Alomyæ, is remarkable for its pyramidal head with an anterior elevation bearing the antennæ. It might form the type of another subgenus—*Hypsicera*(1).

In those, the abdomen is connected with the thorax by the greater portion of its transversal diameter, is almost sessile, nearly cylindrical, and simply widened or thickened towards its posterior extremity. Such are the

Peltastes, Illig.—*Metopius*, Panz.

Where there is a circular elevation under the antennæ, and the lateral edges of the scutellum are turned up and sharp(2).

In the second and last division of those species in which the maxillary palpi are composed of five joints and the labials of four, we observe a profoundly emarginated or almost bifid ligula, and maxillary palpi the joints of which differ but slightly, or change their figure very gradually. The ovipositor projects and is covered at base by a large lamina formed like a vomer. The posterior thighs are thick. The head in several projects in the manner of a snout.

Acænitus, Lat.

When the head presents no anterior projection in the form of a rostrum(3).

Agathis, Lat.

Where it terminates inferiorly in that manner. These Insects approach the following subgenera by their wings(4).

Our second division of the Ichneumons only differs from the first with respect to the number of joints in the palpi, inasmuch as there is one less in the labials, which present but three. As in most of the species of the following division, the second cubital cell is most frequently as large as the first, and nearly square. The ovipositor projects. The point of the mandibles is emarginated or bifid.

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(1) The same works.

(2) *Ichneumon necatorius*, Fab.; Panz., Faun. Insect. Germ., XLVII, 21;—*Ich. migratorius*, Fab.;—*Ich. amictorius*, Panz., Ibid., LXXXV, 14;—*Ich. dissectorius*, Panz., Ibid., XCVIII, 14. See Encyc. Méthod., article *Peltaste*.

(3) Lat., Gen. Crust. et Insect., IV, 9; Encyc. Méthod., Hist. Nat. Insect., X, 37.

(4) Lat., Ibid., 9; Encyc. Méthod., Ibid., 38.

Some present a remarkable hiatus between the mandibles and the clypeus. The maxillæ are prolonged inferiorly beneath the mandibles. The second cubital cell is square and tolerably large. The ovipositor is long. They form the genus

BRACON, Fab. Jur.

From which we might separate, as was formerly done by me, under the generic denomination of VIPION, those species in which the antennæ are short and filiform; in which the maxillæ are proportionally longer, and with the labium form a sort of rostrum; and where the maxillary palpi are hardly longer than the labials.

The species with setaceous antennæ, at least as long as the body, in which the maxillary palpi are much longer than the labials, and where the maxillæ and labium form that sort of rostrum under the mandibles, would alone be Bracones(1).

The others present no hiatus between the mandibles and clypeus. The maxillæ and labium are not prolonged. The second cubital cell is very small. The ovipositor, and even the abdomen are short.

MICROGASTER, Lat.(2)

Our third and last division, corresponding to that of the *Bassus* of M. Nées d'Esenbeck, has, like the first, four joints in the labial palpi, but the maxillary palpi consist of more, that is to say of six. The abdomen is semi-sessile.

Here, the mandibles become gradually narrowed, and terminate as in the preceding Insects, by two teeth, or in an emarginated or bifid point.

HELCON, Esenb.

Where the abdomen, viewed above, presents several annuli, terminates in a long ovipositor, and is not concave beneath(3).

SIGALPHUS, Lat.

Where the abdomen is concave inferiorly, presents but three

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(1) See Lat., Gen. Crust. et Insect., IV, 9; and Encyc. Méthod., Hist. Nat. Insect., X, p. 35.

(2) Lat., Ibid.

(3) Nées d'Esenb., Conspect. Gener. et Famil. Ichneum., p. 29.

segments above, and the ovipositor is contracted and resembles a sting(1).

CHELONUS, Jur.

Where that part of the body, otherwise almost similarly formed, is inarticulated superiorly(2).

There, the mandibles are almost square, with three teeth at the extremity, one in the middle, and the others formed by the projection of the angles of the terminal margin.

ALYSIA, Lat.(3)

We have not yet been able to examine thoroughly, various other genera established by Messrs Gravenhort and Nées d'Esenbeck, in their Conspect. Gen. et Fam. Ichneum., and consequently have not thought it proper to speak of them. That called *Anomalon* by Jurine, must be suppressed. It is a sort of general receptacle, where he has placed all those Ichneumons in which the second cubital cell is wanting, without paying any attention to other organic differences.

In the ~~second~~ third tribe, the GALLICOLÆ, *Diplolepariæ*, Lat., we find but a single nervure in the inferior wings. The superior present some cells or areolæ, viz. two at their base, the brachials, but of which the inner one is usually incomplete and but slightly marked, another radial and triangular, and two or three cubitals, of which the second, where there are three, is always very small, and the third very large, triangular, and closed by the posterior margin of the wing. The antennæ are of equal thickness throughout, or gradually enlarge, but without forming a club, and consist of from thirteen to fifteen joints(4). The palpi are very long(5). The ovipositor is convoluted spirally in the interior of the abdomen, and has its posterior extremity lodged in a groove of the venter.

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(1) Ibid.; Lat., Ibid.

(2) Lat., Ibid.; and the Conspect., &c., of Nées d'Ensenb.

(3) Lat., Ibid. This subgenus appears to connect itself with the Gallicolæ; here the mandibles are always dentated on the inner side.

(4) According to the sex; thirteen in the female Ibaliæ, the same number in the female Figites, and fourteen in the males; fourteen in the female Cynips, and fifteen in their males.

(5) The maxillary palpi usually have four joints, and the labials three, of which the last is rather the thickest.

The Gallicolæ form the genus

Cynips, Lin.

Geoffroy distinguishes these Insects by the improper name of *Diplolepis*, and calls *Cynips* certain Insects of the following family comprised by Linnæus in his last division of the Ichneumons.

These Insects seem to be hump-backed, having a small head and a thick and elevated thorax. Their abdomen is compressed, carinated or trenchant inferiorly, and truncated obliquely, or obtuse, at the extremity. That of the females contains an ovipositor which seems to consist of a single, long, and extremely slender or capillary thread convoluted spirally near the base or towards the origin of the venter, and of which the terminal portion is lodged under the anus between two elongated valvulæ, each of which forms a semi-scabbard or sheath for it. The extremity of this ovipositor is grooved, and has lateral teeth resembling the barbs on the head of an arrow; with these the Insect widens the aperture it has effected in different parts of plants for the purpose of receiving its eggs. The juices of those plants are diffused in the wounded spots and form excrescences or tumours called *galls*. The one most commonly known, or the *gall-nut*, *Aleppo gall*, is employed with a solution of the sulphate of iron to produce a black dye. The form and solidity of these protuberances vary according to the nature of the parts of the plants that have been wounded, such as the leaves, petioles, buds, bark, roots, &c. Most of them are spherical; some resemble fruits, such as the *galles en pomme*, *galles en groseilles*, *galles en pepin*, *galles en nèfle*, &c. Others are fibrous or hairy, like that called the *bedeguar*, *mousse chevelue*, &c., which is observed on the wild Rose-trees. Some of them resemble artichokes, others mushrooms, &c., &c. The eggs enclosed in these excrescences increase in size and consistence, and finally produce larvæ destitute of feet, but frequently provided with mammillæ in place of them. Sometimes they live there solitarily, and sometimes in society, feeding on their internal parietes without interfering with their development, and remaining five or six months in this condition. There also some undergo their metamorphosis, to effect which others issue forth and descend into the earth where they remain till their final change is completed. The round holes observed on the exterior of the gall intimates the exit of the Insect. Several Insects of the following family are also sometimes found in it, but this has been by destroying the natural inhabitants, of whose domicil they have taken possession, in the manner of the Ichneumons.

Certain species are apterous. One species deposits its ova in the pollen of the earliest of the wild Fig-trees. The modern Greeks, in pursuance of a method transmitted to them from antiquity, pierce several of these figs, and place them on their late bearing trees of the same genus; the Cynips soon leave their old dwelling and come out loaded with the fecundating dust, insinuate themselves into the eye of the fruit borne by the latter, fecundate its seeds, and accelerate the period of its maturity. This operation is termed caprification.

IBALIA, Lat. Illig.—*Sagaris*, Panz.—*Banchus*, Fab.

Where the abdomen is strongly compressed in all its height, and is formed like the blade of a knife; the antennæ are filiform. The radial cell is long and narrow; the two branchials are very distinct, and completely or entirely closed, and the two first cubitals are very small(1).

FIGITES, Lat. Jur.

Where the abdomen is ovoid, thickened and rounded superiorly, or simply compressed and trenchant beneath; and where the antennæ are granular and gradually enlarge. There is but one complete brachial cell, the radial is very distant from the extremity of the wing, and the second cubital is wanting(2).

CYNIPS, Lin.—*Diplolepis*, Geoff.

Or Cynips proper, where the abdomen is similar, but the antennæ are filiform and not granular. There is also but one complete cell at the base of the superior wings; there are three cubitals, the first of which is proportionally larger than in the Ibaliæ; the radial is equally elongated.

C. gallæ tinctoriæ; Diplolepis gallæ tinctoriæ, Oliv., Voy. en

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(1) Lat. Gen. Crust. et Insect., IV, p. 17. The maxillary palpi, according to my former observations on this genus, have but five joints, whilst those of the Figites and Cynips have but four.

(2) Lat., Gen. Crust. et Insect., IV, p. 19, and Jurine.

Turq. Very pale fulvous; covered with a silky and whitish down, with a blackish-brown and glossy spot on the abdomen. In the round, hard and tuberculous gall found on a species of Oak in the Levant, which is employed in commerce. By breaking this gall we may frequently obtain the perfect Insect.

C. quercus pedunculi, L.; Reaum., Insect., III, xl, 1—6. Grey, with a linear cross on the wings. It pierces the blossoms of the male flowers of the Oak, producing round tumours which resemble little bunches of fruit.

C. rosæ, L.; Reaum., Insect., III, xlvi, 5—8; and xlvii, 1—4. Black; legs and abdomen, the extremity of the latter excepted, red(1).

The fourth tribe, that of the CHALCIDIÆ, Spin., only differs essentially from the preceding one in the antennæ, which are geniculate, those of the Euchares alone excepted, and which, from the elbow, form an elongated or fusiform club, of which the first joint is frequently lodged in a groove. The palpi are very short. The radial cell is usually wanting; there is never more than one cubital cell, which is not closed. The number of joints of the antennæ never exceeds twelve.

We may refer the various genera established in this tribe to the

CHALCIS, Fab.

These Insects are very small, and are decorated with extremely brilliant metallic colours; most of them enjoy the faculty of leaping. The ovipositor, like that of the Ichneumons, is salient and frequently composed of three threads; the larvæ are also parasitical. Some of them, on account of their extreme minuteness, live in the interior of the almost imperceptible ova of Insects. Others inhabit galls and the chrysalides of the Lepidoptera. I suspect that they do not spin a cocoon.

Some, in which the antennæ always present eleven or twelve joints, have the posterior thighs very large and lenticular, and their tibiæ arcuated.

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(1) For the other species, see Linnæus; Oliv., Encyc. Méthod., article *Diplolépe;* Lat., Hist. Gen. des Crust. et des Insect., XIII., p. 206, and Gen. Crust. et Insect., IV, p. 18; Jurine and Panzer on the Hymenoptera.

Dr Virey has published some new observations on the galls produced by these Insects, from an MS. memoir of the late M. Olivier.

Here the abdomen is ovoid or conical, pointed at its extremity, and pediculated; the ovipositor is straight and rarely salient or external. The wings are extended.

Some are known in which the antennæ of the males are flabelliform.

CHIROCERA, Lat.(1)

Those of the others are simple in both sexes.

CHALCIS, proper.—*Vespa*, *Sphex*, Lin.

Some have the abdominal pedicle elongated; such are those found in marshes, and called *sispes* and *clavipes* by Fabricius. They are both black. The posterior thighs of the first are yellow; those of the second are fulvous.

M. Dalman—Anal. Entom., p. 29—has formed the new genus DIRRHINUS, with an African species of this division, that is remarkable for its deeply bifid head, which, as well as the mandibles, is prolonged anteriorly.

Two other species, enclosed in amber, where the antennæ suddenly terminate in a large ovoid and triarticulated club, and where the ovipositor is salient and as long as the body, seem to him to form a particular genus, which he calls PALMON. See his Memoir on the Insects inclosed in Amber, V, 21—24.

In the others, the pedicle of the abdomen is very short. Such are

C. minuta; vespa minuta, L. Very common on the flowers of umbelliferous plants; black, with yellow legs.

C. annulata, Fab. Found in the nests of the *Vespa nidulans* of South America, and mistaken by Reaumur—Insect., VI, xx, 2, and xxi, 3, 4—for the female of that Wasp. It is black; point of the abdomen elongated; a white dot at the extremity of the posterior thighs; tibiæ white, picked in with white(2).

There, the abdomen seems as if applied to the posterior extremity of the metathorax, or as if sessile; it is rounded or very obtuse at the end, and compressed laterally. The ovipositor curves over the back. The wings are doubled, and the superior ones present a radial cell.

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(1) *Chalcis pecticornis*, Lat., Gener. Crust. et Insect., IV, 26.

(2) See Lat., Gen. Crust. et Insect., IV, p. 25; Fab., Syst. Piez.; Oliv., Encyc. Méthod., article *Chalcis*.

LEUCOSPIS, Fab.

L. dorsigera, Fab., the female; *L. dispar*, the male; Panz., Faun. Insect. Germ., LVIII, 15, the male. Black; abdomen almost twice the length of the thorax, with three yellow bands and two little spots of the same colour. The female deposits her eggs in the nest of the *Abeilles Maçonnes* of Reaumur.

That of another species—*L. gigas*—lays in Wasp's nests(1).

The others, in several of which the antennæ consist of but from five to nine joints, have the posterior thighs oblong, and their tibiæ straight.

Of those in which the antennæ, always simple in both sexes, are composed of from nine to twelve joints, we will first distinguish

EUCHARIS, Lat. Fab.—*Chalcis*, Jur.

The only ones of this tribe in which those organs are straight or non-geniculate. The abdomen is pediculated. I could find no vestiges of palpi in several individuals submitted to my inspection(2).

THORACANTA, Lat.

These Insects, collected in Brazil by M. de Saint-Hilaire, by the prolongation of their scutellum, which covers the wings, represent in Europe those Hemiptera called *Scutellera* by M. Delamarck.

The other subgenera with antennæ still consisting of at least nine simple joints, but which are geniculate; and in which the wings are not covered by the scutellum, may be divided into those where these antennæ are inserted near the middle of the anterior face of the head, or considerably distant from the mouth, and into those where they are inserted close to it.

In those where they are removed from it, some have almost an ovoidal abdomen, compressed on the sides, or higher than it is wide, and a usually salient and ascending ovipositor. Such are those which form the

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(1) See the same works and the Monograph of this genus by Klüg, in the Mem. Nat. Cur. of Berlin. Swammerdam appears to have known one of these species.

(2) Lat., Gener. Crust. et Insect., IV, 20.

AGAON, Dalm.

They are very remarkable for the magnitude and length of their head, and for their antennæ, of which the first joint is very large and forms a triangular palette; the three last form an abrupt and elongated club. They are covered with hairs(1).

EURYTOMA, Illig.

Where the antennæ are as if knotted and furnished with whirls of hairs in the males. The ovipositor is short(2).

MISOCAMPE, Lat.—*Diplolepis*, Fab.

Where they are composed, in both sexes, of compact joints and are destitute of the whirls of hairs. The ovipositor is long.

The larva of one species inhabits the gall of the wild Rose tree, and devours that of the Cynips, which formed it(3).

In the others the abdomen is flattened above, and either triangular and terminated in a long point in the females, or almost cordiform or nearly orbicular. The ovipositor is usually concealed, or but slightly salient.

Here the nervure of the superior wings, situated near the margin, is always curved, and unites with the callous point at the exterior edge. The two posterior legs are the longest. The inner spine of the intermediate tibiæ is small.

PERILAMPUS, Lat.

Where the mandibles are strongly dentated; the club of the antennæ is short and thick; the abdomen short, cordiform, and not prolonged at the extremity, and the scutellum thick and salient(4).

In the two following subgenera the abdomen of the females is prolonged into a conical point. The club of the antennæ is narrow and elongated.

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(1) Dalm., Anal. Entom., 30; II, 1—6.

(2) Lat., Gener. Crust. et Insect., IV, 27.

(3) Lat., Ibid., 29; genus *Cynips*.

(4) Lat., Ibid., 30.

PTEROMALUS, Lat.—*Cleptes*, Fab.

Where the thorax is short and not narrowed anteriorly(1).

CLEONYMUS, Lat.

Where it is elongated and narrowed anteriorly. The abdomen is also proportionally longer, and the antennæ are inserted more inferiorly(2).

There the nervure of the superior wings, situated near the margin, is sometimes straight, and unites at the callous point. The intermediate legs are the longest, and the inner side of their tibiæ is furnished with a stout spine.

The scutellum projects.

EUPELMUS, Dalm.

Where the infra-costal nervure, as in the preceding Insects, is curved, and unites at the exterior margin, before the callous point. The first joint of the intermediate tarsi is large, and ciliated beneath(3).

ENCYRTUS, Lat.

Where that nervure is straight and unites at the callous point, or rather at the branch which commences the cubital cell. The club of the antennæ is compressed and truncated at the end(4).

SPALANGIA, Lat.

Distinguished from the preceding by the generally longer antennæ, which are inserted close to the anterior margin of the head(5).

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(1) Lat., Ibid., 31.
(2) Lat., Ibid., 29.
(3) Dalm., Monog. of the Pteromalini.
(4) Lat., Gener. Crust. et Insect., IV, 31.
(5) Lat., Ibid., 29.

EULOPHUS, Geoff. Lat.—*Entodon*, Dalm.

But from five to eight joints in the antennæ; those of the males ramous(1).

In the fifth tribe, that of the OXIURI, Lat., we observe species similar to the preceding in the absence of nervures in the inferior wings, and in which the abdòmen of the females is terminated by a tubular and conical ovipositor, sometimes internal, exertile and protruding through the anus like a sting, and sometimes external and forming a sort of tail or terminal point. The antennæ are composed of from ten to fifteen joints, and are either filiform or somewhat largest near the end, or clavate in the females. The maxillary palpi of several are long and pendent.

We reduce the various genera of which it is composed to one, the

BETHYLUS, Lat. Fab.

The habits of these Insects are probably those of the Chalcidiæ; but as most of them are found on the sand or low plants, I suspect that their larvæ live in the ground.

Some have brachial cells or nervures in the superior wings. Their maxillary palpi are always salient. Their antennæ are filiform, or simply and gradually enlarge in both sexes.

Here, they are inserted near the mouth.

DRYINUS, Lat.—*Gonatopus*, Klüg.

Where the antennæ are straight and consist of ten joints in the two sexes, the last ones somewhat thicker than the others. The thorax is divided into two knots. The anterior tarsi terminate by two large dentated hooks, one of which is flexed. Some of the females are apterous(1).

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(1) Lat., Ibid., 28; Nouv. Dict. d'Hist. Nat., 2d edit., and Lin. Trans., XIV, p. 111. For these various subgenera, see Mémoire sur les Diplolépaires, by M. Maximilian Spinola, published in the Ann. du Mus. d'Hist. Nat., as well as the excellent work of M. Dalman, on the Insects of this tribe.

Anteon, Jur.

Where the antennæ also consist of ten joints, at least in the males; but the thorax is continuous. All the tarsi are terminated by ordinary, simple, and straight hooks. The superior wings have a large cubital point(2).

Bethylus, Lat. Fab.—*Omalus*, Jur.

Where the antennæ are geniculate and consist of thirteen joints in both sexes; where the head is flattened, and the pro-thorax elongated and almost triangular(3).

There, the antennæ, always composed of from thirteen to fifteen joints, are inserted near the middle of the anterior face of the head.

Sometimes they are straight or nearly so.

Proctotrupes, Lat.—*Codrus*, Jur.

Where they consist of thirteen joints in both sexes. The mandibles are arcuated and dentated on the inner side; the abdomen is briefly and insensibly pediculated, terminating, in the females, in a frequently long and horny point or tail forming the ovipositor; the second ring is very large(4).

Sometimes the antennæ are very distinctly geniculate.

Helorus, Lat. Jur.

Where the antennæ consist of fifteen joints. The mandibles are dentated on their inner side. The first abdominal segment forms an abrupt, long, and cylindrical pedicle(5).

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(1) Lat., Gen. Crust. et Insect., IV, 39; Dalm., Annal. Entom. 7.

(2) Jur., Hymenop.

(3) Lat., Ibid., 40.

(4) Lat., Ibid., 38.

(5) Lat., Ibid., 38.

Belyta, *Cinetus*, Jur.

Where the antennæ are composed of fourteen or fifteen joints; they are filiform in the males, more granose and thicker near the end in the females(1).

The other Oxiuri have neither cells, nor brachial, nor basilary nervures.

These have their antennæ inserted on the forehead.

Diapria, Lat.—*Psilus*, Jur.

No cell whatever in the wings. The maxillary palpi are salient, and the antennæ have fourteen joints in the males, or twelve in the females(2).

In those they are inserted near the mouth.

Ceraphron, Jur. Lat.

Wings furnished with a radial cell; the maxillary palpi salient; the antennæ filiform in both sexes, and consisting of eleven joints; abdomen ovoido-conical(3).

Sparasion, Lat.

Similar to Ceraphron in the radial cell, and the projection of the maxillary palpi; but the antennæ have twelve joints in both sexes, are thickest at the extremity or clavate in the females, and the abdomen is flattened(4).

Then follow two subgenera also provided with a radial cell, and in which the antennæ, as in Sparasion, are thickest at the end or clavate in the females, and where the abdomen is flattened; but the palpi are very short and do not project, or are not pendent.

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(1) Lat., Ibid., 37.

(2) Lat., Ibid., 36.

(3) Lat., Gener. Crust. et Insect., IV, 35. [For some account of an American species of this Insect, the *destructor*, which deposits its ova in the bodies of the larvæ of the *Cecidomyia destructor* or Hessian-Fly, see Say, Journ. Ac. Nat. Sc. of Philad. vol. I, part i, p. 47, 48. *Am. Ed.*]

(4) Lat., Ibid., 34.

Teleas, Lat.

Where the antennæ are composed of twelve joints(1).

Sparasion, Lat.

Where those organs consist of but ten joints(2).

In the last subgenus, or

Platygaster, Lat.

The radial cell disappears. The antennæ of both sexes have but ten joints, of which the first and third are much elongated. The palpi are very short. The abdomen is flattened and in the form of a spatula.

To this subgenus I refer the *Psile de Bosc* of Jurine, a singular Insect in which the first ring of the abdomen gives origin to a solid horn which curves forwards to above the head, and which, according to the observations of an able naturalist, M. Leclerc de Laval, is the sheath of the ovipositor. This species is very small and entirely black(3).

In the sixth tribe, or the Chrysides, Lat., the inferior wings, as in the three preceding tribes, are not veined; but their ovipositor is formed by the last rings of the abdomen in the manner of the tubes of a spy-glass, and terminates in a little sting. The abdomen, which in the females appears to consist of but three or four rings, is concave or flat beneath, and can be flexed on the pectus, in which state the Insect is globular.

This tribe comprises the genus

Chrysis, Lin.

The lustre and richness of the colours which decorate these Insects may challenge a comparison with those of the Humming-birds, and have entitled them to the common appellation of *Golden Wasps*, or *Guêpes dorées*. They are seen walking about in a continued state of agitation, and with hasty motions, on walls and fences exposed to the burning ardour of the sun. They are also found on flowers. Their body is elongated and covered with a firm tegument. Their antennæ are filiform, geniculate, vibratile, and composed of thirteen joints in both sexes. The mandibles are narrow, arcuated, and pointed. The maxillary palpi are filiform, usually longer than those of the labium, and composed of five unequal joints; the latter consist of three. The ligula is most frequently emarginated. The thorax is semi-cylindrical, and presents several sutures or impressed and transverse lines. The abdomen of the greater number forms a semi-oval truncated at base, and at the first glance seems suspended to the thorax by its whole width; the last ring is frequently marked by large punctures and terminates by dentations.

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(1) Lat., Ibid., 32.
(2) Lat., Ibid., 32.
(3) Lat. Gener. Crust. et Insect. IV, 32.

The Chrysides deposit their ova in the nests of the solitary Mason Bees, or in those of other Hymenoptera. Their larvæ devour those of the latter.

In some the maxillæ and labium are very long, forming a false proboscis that is bent underneath, and the very small palpi are bi-articulated.

PARNOPES, Lat.

The *P. carnea* places its eggs in the nest of the *Bembex rostrata*, Fab.(1)

The others are destitute of this false proboscis; their maxillary palpi are moderate or elongated and composed of five joints; those of the labium have three.

Sometimes the thorax is not narrowed anteriorly; the abdomen is semi-oval, concave, and presents externally but three segments, as in Chrysis proper or

CHRYSIS, Fab.

Those, in which the four palpi are equal, and where the ligula is profoundly emarginate, form the genus

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(1) Lat. Gen. Crust. et Insect., IV, p. 47, and the Ann. du Mus. d'Hist. Nat.

Stilbum, Spinol.

To which may be united the *Euchræus* of Latreille(1).

Those, in which the maxillary palpi are much longer than the labial, the ligula is emarginated, and the abdomen rounded and entire at the extremity, have been generically distinguished by the name of

Hedychrum.

Those which, similar to the Hedychra in the relative proportions of the palpi, have a rounded and entire ligula, form two genera. In the first or

Elampus, Spin.

The mandibles have two teeth on the inner side; the abdomen is entire and rounded at the end, and the posterior extremity of the thorax is furnished with a spine. In the second, or Chrysis, Spin., there is but a single dentation on the same edge; the abdomen is more elongated, truncated at the end, and frequently a transverse range of large punctures at the same extremity. In this subdivision comes the most common species in Europe.

C. ignita, L.; Panz., Faun. Insect. Germ., V, 22. Blue mixed with green; abdomen golden cupreous-red, and terminated by four dentations.

Sometimes the thorax is narrowed before; the abdomen is almost ovoidal without being arched, and presents four segments in the females and five in the males.

Cleptes, Lat.

Where the mandibles are short and dentated. The ligula is entire(2).

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(1) Messrs Lepeletier and Serville, Encyc. Méthod., have given the generic appellation of *Pyria* to certain Insects closely allied, according to them, to Stilbum, but in which the metathorax presents a scutelliform projection, the head offers no depression, and where the simple eyes are arranged in a triangle, those on the sides being considerably distant from the ordinary eyes.

(2) For all these divisions, see Lat., Gen. Crust. et Insect., IV, p. 41, et seq.;

The second section of the Hymenoptera, that of the ACULEATA, differs from the first in the absence of the ovipositor. A concealed and retractile sting composed of three pieces usually supplies the place of it in the females, and in the neuters of species which form communities. Sometimes, as in certain Ants, this sting is wanting, and the Insect defends itself by the ejaculation of an acid liquid contained in special glandular reservoirs(1).

The Hymenoptera of this section always have their antennæ simple, and composed of a constant number of joints, namely, of thirteen in the males, and twelve in the females. The palpi are generally filiform, those of the maxillæ, frequently the longest, having six joints, and those of the labium four. The mandibles are smaller, and frequently less dentated in the males than in the opposite sex. The abdomen, united to the thorax by a thread or pedicle, is composed of seven rings in the males, and of six in the females. The four wings are always veined, and present the various sorts of ordinary cells. The larvæ are always destitute of feet, and feed on aliments presented to them by the females or neuters, consisting either of the bodies of Insects, the juices of fruits, or a mixture of pollen, stamina and honey.

This section is divided into four families.

Améd., Lepeletier, Ann. du Mus. d'Hist. Nat.; Max., Spinola, Insect. Ligur; Jurine and Panzer on the Hymenoptera.

(1) For details relative to the organs which produce this venomous fluid, see the Mémoire sur les Abeilles of Reaumur, and that of M. Leon Dufour, quoted in our general observations upon the Insects of this order.

FAMILY I.

HETEROGYNA.

The first family of our second section is composed of two or three kinds of individuals, the most common of which, the neuters and females, are apterous, and but rarely furnished with very distinct ocelli.

Their antennæ are always geniculate, and the ligula is small, rounded and concave, or cochleariform.

Some form communities in which we find three kinds of individuals, of which the males and females are winged, and the neuters apterous. In the two last the antennæ gradually enlarge, and the length of their first joint is at least equal to that of the third of the whole organ; the second is almost as long as the third, and has the form of a reversed cone. The labrum of the neuters is large, corneous, and falls perpendicularly under the mandibles.

These Hymenoptera compose the genus

FORMICA, Lin.(1)

Or that of the Ants, so highly celebrated for their foresight, and so well known, some by their depredations in our houses, where they attack our sugar and preserved viands, communicating to them at the same time a musky and disagreeable odour, and others by the injury they do to our trees, by gnawing their interior in order to form domicils for their colonies.

The abdominal pedicle of these Insects is in the form of a scale or knot, either double or single, a character by which they are easily recognized. Their antennæ are geniculate, and usually somewhat largest near the extremity; the head is triangular, with oval or rounded and entire eyes, and the clypeus large; the mandibles are very strong in the greater number, but vary greatly as to form in the neuters; the maxillæ and labium are small; the palpi are filiform, and those of the maxillæ the longest; the thorax is compressed laterally, and the almost ovoidal abdomen furnished, in the females and neuters, sometimes with a sting, and sometimes with glands in the vicinity of the anus, that secrete a particular acid called *formic.*

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(1) The tribe of the FORMICARIÆ, Lat., Fam. Nat. du Règn. Anim., 452.

They form communities which are frequently extremely numerous. Each species consists of three kinds of individuals: *males* and *females* which are furnished with long wings, less veined than those of the other Hymenoptera of this section, and very deciduous; and *neuters*, destitute of wings, which are merely females with imperfect ovaries. The males and females are merely found within the domicil in transitu. They leave it the moment their wings are developed. The males, much inferior in size to the females, and with a proportionally smaller head and mandibles, fecundate them in the air, where they form numerous swarms and soon after perish without returning to their natal hill, where their presence is no longer requisite. The females, now ready to become mothers, wander to a distance from their birth-place, and having detached their wings by means of their feet, found a new colony. Some of those however which are in the vicinity of the ant-hills are arrested by the neuters who force them to return to their domicil, tear off their wings, prevent them from leaving it, and force them to deposit their eggs there—it is thought, however, that they are violently expelled the moment that operation is effected.

The *neuters*, which are distinct, not only by the want of wings and ocelli, but also by the size of their head, the strength of their mandibles, their more compressed and frequently knotted thorax, and their proportionally longer legs, have the sole charge of all the economy of the habitation, and the rearing of the young. The nature and form of their nests or ant-hills vary according to the particular instinct of the species. They usually establish it in the ground; in its construction some only employ particles of earth, and almost entirely conceal it; others seize on fragments of various bodies and with them raise conical or dome-like hillocks over the spot in which they are domiciliated. Some establish their dwelling in the trunks of old trees, the interior of which they perforate in every direction in the manner of a labyrinth, in which the detached particles are also employed. Various and apparently irregular galleries lead to the particular residence of their young.

The neuters roam abroad in search of provisions, appear to intercommunicate the success of their labours by the senses of touch and smell, and to aid and assist each other. Fruit, Insects, or their larvæ, dead bodies of small quadrupeds and birds, &c., constitute their food. They feed the larvæ with their mouths, transport them in fine weather to the external superficies of the hill, in order that they may receive additional warmth, and take them down again on the approach of night or bad weather, defend them from their enemies, and look to their preservation with the greatest fidelity, particularly when the hill is disturbed. They pay equal attention to the nymphs, some of which are enclosed in a cocoon, and the others naked; they tear open the envelope of the former when the moment of their ultimate metamorphosis has arrived.

I have observed neuters in various ant-hills, remarkable for a head much larger than common, and for the unusual fewness of their number. M. Dupont de Nemours, without being a naturalist, had also previously noticed this difference(1). M. de la Cordaire, whom I have already mentioned, has given me a neuter allied to the *alta cephalotes* of Fabricius, and assures me that individuals of this kind were the defenders of their community, and apparently fulfilled the functions of Captains in their excursions, at which time they marched along the sides of the main body.

The name of *eggs* is vulgarly applied to the larvæ and nymphs; those of the *F. rufa* are eaten by young Pheasants. The neuters prevent the individuals with newly acquired wings from issuing forth until the proper moment has arrived, which is always determined by the heat of the atmosphere. They then open a passage for them and let them go.

Most ant-hills are wholly composed of individuals of the same species. Nature, however, has deviated from this plan with respect to the *F. roussatre* or Amazon-ant, and that which I have called the *sanguinea.* Their neuters, by open violence, procure auxiliaries of their own caste but of different species, which I have designated by the names of *noir-cendrée* and *mineuse.* When the heat of the day begins to lessen, and exactly at the same hour, at least for several days, the *Amazons* or *Legionnaires* quit their nest, advance in a solid column, more or less numerous or according to the extent of the population, and march upon the Ant-hill they wish to attack. They soon penetrate into it notwithstanding the opposition of the inhabitants, seize the larvæ and nymphs of the neuters peculiar to the invaded community, and transport them in the same warlike order to their own domicil, where they are attended to in common with the posterity of their conquerors, by other neuters of their own species in a perfect state that have either been metamorphosed there, or torn from their original dwelling. Such is the composition of the *mixed Ant-hills*. For these curious observations, which I have verified, we are indebted to M. Huber, Jun., who is so gloriously pursuing the career of his father.

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(1) See his Recherches sur les Fourmis Indigènes.

It is well known that the Ant is extravagantly fond of a saccharine liquid that exudes from the bodies of the Aphides and Gallinsecta. Four or five species convey both these Aphides and their eggs, particularly in bad weather, to the bottom of their nests, and even fight for the right of possession. Some construct little galleries of earth, leading from the Ant-hill, which extend throughout the entire length of trees to the very branches that are loaded with these Insects. These interesting facts have also been observed by the naturalist just referred to(1).

Both males and females perish towards the close of autumn, or on the first approach of winter. The labourers pass the winter in their hill in a torpid state, and their so highly vaunted foresight in this respect has no other aim than that of augmenting and consolidating their habitation by all sorts of means, for provisions would be useless at a period when they are incapacitated from using them(2).

The economy of the Ants foreign to Europe, and those of tropical countries particularly, is unknown to us. If those, called the *Fourmis de visite* by the French colonists, are sometimes of use to them by purging their dwellings of Rats, and a multitude of destructive or disagreeable Insects; other species induce them to curse their existence on account of the extent of their depredations, which it is impossible to prevent.

I divide the genus Formica in the following manner:

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(1) See his Recherches sur les Fourmis Indigènes.

(2) How will this reasoning apply to those that dwell in the interior of trees, &c., and whose habitations do not require this consolidation, or to those that inhabit tropical countries, where hibernation is out of the question, but where, at certain seasons, they are liable to be confined to their abodes for weeks in succession by heavy rains? What is to become of the larvæ during this period of occlusion, if the nurses which feed them are themselves destitute of nourishment? Various Rodentia, that are known to pass the winter in a state of lethargy, lay by ample supplies, on which they feed early in the spring, or in the event of a fortuitous disturbance of their slumbers, and it is a fact worthy of notice, that the Ant, wherever it is found—generally speaking, and always supposing its domicil to be completed—always prefers particles of sugar, animal matter, and of what may strictly be denominated *provisions*, to substances much more durable and better calculated for building. *Am. Ed.*

FORMICA,

Or Ants properly so called, in which the sting is wanting, and the antennæ are inserted near the front; their mandibles are triangular, dentated and incisive. The pedicle of the abdomen never consists of more than one scale or knot.

F. bispinosa, Lat., Hist. Nat. des Fourm., p. 133, iv, 20. Black; two spines before the thorax; scale of the abdomen terminated in a long and sharp point. It forms its nest with a large quantity of down, apparently derived from a species of Gossampinus.—Inhabits Cayenne.

F. rufa, L.; Lat., Ibid., v, 28. The neuter about four lines in length, blackish; thorax, scale, and great part of the head, fulvous; thorax unequal; the ocelli somewhat apparent. It forms conical or dome-like and frequently large hills in the woods, composed of earth, ligneous fragments, &c. It produces formic acid. The winged individuals appear in the spring.

F. sanguinea, Lat., Ibid., v, 29. The male similar to the preceding ones, but of a blood-red colour; abdomen cinereous-black. It inhabits the woods, and is one of those denominated *Amazons* or *Legionnaires* by M. Huber.

F. cunicularia, Lat. Head and abdomen of the male black; vicinity of the mouth, under part of the head, thorax, legs and first joint of the antennæ, pale fulvous. This and the following species are those captured by the Amazons, and transported to their hills, in order to aid and replace them in the rearing of their young.

F. fusca, L.; *F. noir cendrée*, Lat., Ibid., vi, 32. The male cinereous-black and glossy; base of the antennæ and legs reddish; the scale large and almost triangular; three apparent ocelli.

POLYERGUS, Lat.

Where the sting is still wanting, but where the antennæ are inserted near the mouth, and the mandibles are narrow, and arcuated or strongly hooked.

F. roussâtre, Lat., Ibid., vii, 38, is the species more particularly called Amazon by M. Huber. See his Recherches sur les Fourmis, &c., p. 210—260, pl. ii, *F. roussâtre*. In all France.

PONERA, Lat.

The males and females armed with a sting; pedicle of the abdomen formed of a single scale or knot; antennæ of the individuals mentioned, thickest towards the end; mandibles triangular, and the head nearly so, without any remarkable emargination at its posterior extremity.

F. contracta, Lat., Ibid., vii, 40. The males are nearly destitute of eyes, and live under stones in trifling numbers. They are very small, black, and almost cylindrical; antennæ and legs yellowish-brown.

ODONTOMACHUS, Lat.

Where the pedicle of the abdomen is also formed of a single knot, but terminates superiorly in the form of a spine. The antennæ of the males are very small and filiform; the head of these same individuals forms a long square, and is much emarginated posteriorly; their mandibles are long, narrow, parallel, and terminated by three teeth.

All the species are foreign to Europe(1).

MYRMICA, Lat.

Also furnished with a sting, but where the pedicle of the abdomen is formed of two knots. The antennæ are exposed; the maxillary palpi long and composed of six joints; the mandibles are triangular. Such is the

F. rouge, Lat., Ibid., x, 62. The males are reddish and finely granulated, with a glossy and smooth abdomen; a spine under the first knot of the pedicle; the third ring somewhat brown. It stings severely. In woods.

ECITON, Lat.(2)

This subgenus consists of species entirely similar to the Myrmicæ, with the exception of their mandibles, which are linear.

ATTA, Fab.(3)

Only differing from Myrmica in the very short palpi; those of the maxillæ consist at least of six joints. The head of the neuters is usually very large.

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(1) Lat., Gener. Crust. et Insect., IV, 128.

(2) Lat., Ibid., 130.

(3) ŒCODOMA of the Nouv. Dict. d'Hist. Nat., 2d edition.

Atta cephalotes, Fab.; *Fourmi de visite*, Lat., Ibid., ix, 57.

CRYPTOCERUS, Lat.

Always provided with a sting, and the abdominal pedicle formed of two knots; but the head, very large and flattened, has a groove on each side for the reception of a portion of the antennæ.

The species are peculiar to South America(1).

The remaining Heterogyna are solitary Insects. Each species is composed of but two kinds of individuals, *winged males* and *apterous females*; the latter are always armed with a powerful sting. The antennæ are filiform or setaceous, and vibratile; their first and third joints are elongated, and the length of the first is never equal to the third of the total length of the whole organ.

They form the genus

MUTILLA, Lin.(2)

In some species, of which the males only have been observed, the antennæ are inserted near the mouth, the head is small, and the abdomen long and almost cylindrical, as in

DORYLUS, Fab.

Insects peculiar to Africa and India(3).

LABIDUS, Jur.

Hymenoptera of South America, differing from the Doryli in their mandibles, which are shorter and narrower, and in their maxillary palpi, that are at least as long as those of the labium, and composed at least of four joints; in Dorylus, they are very small and at most biarticulated(4).

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(1) See Lat., Hist. Nat. des Fourmis; Gen. Crust. et Insect., IV, p. 124; Huber, Recherches sur les Fourmis Indigènes; Fabricius, &c.

(2) Tribe of the MUTILLARIÆ, Lat., Fam. Nat. du Règne Animal, 452.

(3) See Fabricius; and Lat., Gen. Crust. et Insect., IV, p. 123.

(4) See Jurine and Lat., Ibid.

In the others, the antennæ are inserted near the middle of the face of the head, which is larger than in the preceding Insects; the abdomen is sometimes conical, and sometimes ovoidal or elliptical. They form the genus

MUTILLA, proper.

These Insects are found in hot and sandy localities. The female runs with great quickness, and is always seen on the ground. The males frequently alight on flowers, but their mode of life is unknown.

The species, in the females of which the thorax is almost cubital, and without knots or appearance of divisions above, compose the genera APTEROGYNA(1), PSAMMOTHERMA, and MUTILLA of Latreille. The abdomen of the Apterogynæ has the two first annuli in the form of knots, as in several Formicæ. The antennæ of the males are long, slender and setaceous. Their superior wings only present brachial or basilary cells, and a single, small, rhomboidal, cubital cell. In the Psammothermæ(2) and the Mutillæ there are three, with two recurrent nervures. Besides this, the second segment of the abdomen is much larger than the preceding one, and forms no knot. The antennæ of the male Psammothermæ are pectinated, and those of the Mutillæ simple in both sexes.

> *M. europæa*, L.; *M. tricolore*, Coqueb., Illust. Icon. Insect., dec. II, xvi, 8. The female is black, with a red thorax and three white bands on the abdomen; the two last approximated. She is provided with a powerful sting. The male is bluish black with a red thorax and the abdomen as in the female(3).

Those species, which, in both sexes, have the thorax equal above but divided into two distinct segments, with the abdomen conical in the females and elliptical and depressed in the males, compose the genus

MYRMOSA, Lat. Jur.(4)

Those, in which the thorax of the females is still oval above, but

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(1) Lat., Gen. Crust. et Insect., IV, p. 121. See the Dict. Class. d'Hist. Nat.; Dalm., Anal. Entom., 100, where he gives the figure of the *Scolia globularis*, Fab., the male of another species of *Apterogyna*.

(2) *Mutilla flabellata*, Fab.; the late M. Delalande brought a species of this genus from the Cape of Good Hope.

(3) Ibid.; Oliv., Encyc. Méthod., article *Mutille;* and Klüg, Entom. Brazil. Specim.

(4) Lat., Ibid., p. 119, and Jurine on the Hymenoptera.

divided into three segments by sutures, where the maxillary palpi are very short, and the second joint of the antennæ is set in the first, form the genus

MYRMECODA, Lat.(1)

SCLERODERMA, Klüg.

Only differs from Myrmecoda in the elongation of the maxillary palpi and antennæ, of which the second joint is exposed(2). In

METHOCA, Lat.

The top of the thorax is as if knotted or articulated(3).

FAMILY II.

FOSSORES(4).

The second family of this section comprises those Hymenoptera armed with a sting, in which all the individuals of both sexes are furnished with wings, and live solitarily; in which the legs are exclusively adapted for walking, and in several for digging. The ligula is always more or less widened at its extremity and never filiform or setaceous. The wings are always extended.

They compose the genus

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(1) Lat., Ibid., p. 118.

(2) Lat., Ibid.

(3) Lat., Ibid.

(4) M. Van der Linden, already quoted, has lately acquired a new title to our esteem, by the publication of the first part of a Monograph of the European Insects of this family. See Observ. sur les Hymen. d'Eur., de la Fam. des Fouisseurs.

N.B. The divisions of the family of the Fossores form so many principal genera or subgenera. SCOLIA, SAPYGA, SPHEX, BEMBEX, LARRA, NYSSON, CRABRO and PHILANTHUS.

SPHEX, Lin.

Most females of this genus place beside their eggs, in the nests they have constructed, most commonly in the earth or in wood, various Insects or their larvæ, and sometimes Arachnides, previously pierced with their sting, to serve as food for their young. The larvæ are always destitute of feet, resemble little worms, and undergo a metamorphosis in the cocoon they have spun previous to becoming nymphs. The perfect Insect is usually very active and lives on flowers. The maxillæ and lip are elongated and in the form of a proboscis in many.

We will distribute the numerous subgenera derived from the primitive genus Sphex into seven principal sections.

In the two first the eyes are frequently emarginated; the body of the males is usually narrow, elongated, and terminated posteriorly, in a great many, by three points in the form of spines or dentations.

1. Those, in which the first segment of the thorax is sometimes in the form of a bow, and prolonged laterally to the wings, and sometimes forms a transversal square, or resembles a knot or joint; in which the legs are short, thick, very spinous or densely ciliated, with the thighs arcuated near the knee; and in which the antennæ of the females are evidently shorter than the head and thorax. These are the SCOLIETÆ of Latreille, so named from the genus

SCOLIA(1).

In some the maxillary palpi are long, and evidently composed of unequal joints; the first joint of the antennæ is almost conical. Such is

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(1) The Scolietæ may be divided thus:

I. Palpi always very short. Ligula with three linear divisions. Anus of the male terminated by three spines. The thick or callous point of the superior wings replaced by a small cell.

SCOLIA proper.

II. The maxillary palpi elongated in several. The ligula broad, and widened at the extremity. A recurved spine at the anus of the males. A thick distinct point in the superior wings.

A. Second joint of the antennæ exposed. Two complete cubital cells, or three, but of which the intermediate is small and petiolate.

a. No incomplete cubital cell closed by the posterior border of the wing. Radial cell null or open in the females.

TIPHIA. MERIA.

TIPHIA, Fab.

To which we may unite the TENGYRA of Latreille(1).

In the others the maxillary palpi are short and composed of almost similar joints; the first of the antennæ is elongated and almost cylindrical.

Sometimes this joint receives and conceals the following, as in

MYZINE, Lat.

Where the mandibles are dentated(2).

MERIA, Illig.

Where they are not dentated(3).

Sometimes the second joint of the antennæ is exposed, as in SCOLIA proper, or

SCOLIA, Fab.(4)

2. Those Fossores in which the first segment of the thorax is formed as in the preceding ones, where the legs are still short, but slender, and neither spinous nor strongly ciliated, and where the antennæ in both sexes are at least as long as the head and thorax.

Their body is usually smooth, or but very slightly pubescent.

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b. An incomplete cubital cell, closed by the posterior border of the wing.

TENGYRA.

B. Second joint of the antennæ enclosed in the first. Four cubital cells, the last closed by the posterior border of the wing in the males, and neither of them petiolate.

MYZINE.

M. Leon Dufour—Journ. de Phys., Septemb. 1818—has published some curious observations on the anatomy of the Scoliæ.

(1) Lat., Gen. Crust. et Insect., IV, p. 116; Fabricius; Jurine; Van der Linden.

(2) Lat., Ibid.; Van der Linden.

(3) Lat., Ibid.; Van der Linden.

(4) Lat., Ibid.; Fab. See also the Monograph of the Fossores by Van der Linden.

This subdivision embraces the family of the SAPIGYTES of Latreille, a name derived from that of the principal genus

SAPYGA.

In some the antennæ are filiform or setaceous, as in

THYNNUS, Fab.

Where the eyes are entire(1).

POLOCHRUM, Spin.

Where they are emarginated, and the mandibles, besides, multidentated(2).

In the others the antennæ are thickest at the extremity, or in some males even clavate. Their remaining characters are those of the Polochra. Such is Sapyga proper, or

SAPYGA, Lat.

These Insects flit about trees and walls, exposed to the heat of the sun, and appear to deposit their eggs there(3).

The Ceramii of Latreille, according to the form of the first segment of the thorax and their extended or applicated wings, belong to this subdivision, but more important affinities place them in the family of the Diploptera.

3. Fossores still allied to the preceding in the extent and form of the first segment of the thorax, but in which the posterior legs are at least as long as the head and trunk, and the antennæ are most frequently slender, formed of elongated, lax, or but slightly compact and strongly arcuated or curled joints, at least in the females.

They are united by Latreille in the family of the SPHEGIDES, a name derived from that of the dominant genus

SPHEX.

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(1) Lat., Ibid. The *Scotænæ* of Klüg appear to me to differ but slightly from the Thynni; they have the same kind of antennæ, similar wings, the first cubital cell also traversed by a small line, &c. The anus of the males is slightly recurved, a character which approximates them to Tengyra, and various other divisions of the preceding division.

(2) Lat., Ibid.; Van der Linden.

(3) Lat., Gen. Crust. et Insect., IV, p. 116; Van der Lind.

In some the first segment of the thorax forms either a transversal or longitudinal square, and the abdomen is attached to the thorax by a very short pedicle; the inner side of the posterior tibiæ is usually furnished with a brush. The superior wings have two or three complete or closed cubital cells, and another imperfect and terminal.

They now form several subgenera.

PEPSIS, Fab.

To which I assign the following characters: labrum apparent; antennæ, at least of the males, almost straight and composed of compact or crowded joints; maxillary palpi hardly longer than the labial, projecting, and formed of but slightly unequal joints; three complete cubital cells, and the first recurrent nervure inserted near the anterior extremity of the second. The tibiæ and first joint of the posterior tarsi are compressed in the males.

All the species known are foreign to Europe, and most abundant in South America and the Antilles; they are large, and have coloured wings(1).

CEROPALES, Lat. Fab.

The labrum and antennæ of the Pepses; but the maxillary palpi are much longer than the labial, pendent, and with very unequal joints(2).

POMPILUS, Fab.

The Pompili, in this latter respect, resemble the Ceropales, but the antennæ of both sexes are curled and composed of loose or but slightly compact joints; the labrum is concealed or but little exposed.

According to Fabricius and the more recent systems, we must restrict this subgenus to those species in which there are three complete cubital cells, neither of them petiolate, the maudibles are unidentated on the inner side, and the thorax is slightly or moderately elongated in comparison with its width. These Insects lay up provisions for their larvæ, consisting of Araneides, which they first put to death with their sting, and then transport to the holes destined for the domicil of their young.

P. viaticus; Sphex viatica, L.; Panz., Faun. Insect. Germ.,

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(1) Lat., Gen. Crust. et Insect., IV, 61.

(2) Lat., Ibid., 62; Van der Lind., Observ. on the Hymen. of Eur., 76.

LXV, 16. Deep black; abdomen red, intersected with black circles.

The second family of the genus *Misque* of Jurine is composed of true Pompili, but in which the third cubital cell is small and petiolate(1).

That of *Salius*, Fabricius, was established on the males of certain species in which the prothorax and metathorax are proportionally longer than those of the Pompili, and the mandibles present no dentations(2).

Planiceps, Lat., Van der Lind.

Closely allied to Salius in the general form of the body; but the head is flat and its posterior margin concave, its ocelli are very small and distant, and the eyes elongated and occupying its sides. The antennæ are inserted near the anterior margin. The two anterior legs are distant from the others, short, curved underneath, and have large coxæ and thighs. There are but two complete cubital cells in the upper wings, the second of which receives the first recurrent nervure; the incomplete or terminal cell receives the other nervure at a short distance from its junction with the second cell.

A second species, besides the one on which this subgenus was founded(3), has been discovered in Brazil by M. de la Cordaire, who was kind enough to give it to me, and whose name it will bear. In

Aporus, Spin.

There are also but two complete cubital cells; but the second receives the two recurrent nervures. The Apori, in all else, resemble the true Pompili(4).

In the others the first segment of the thorax is narrowed before in the form of a joint or knot, and the first ring of the abdomen, sometimes even a part of the second, is narrowed into an elongated pedicle. Their superior wings always present three complete cubital cells and the commencement of a fourth.

Those in which the mandibles are dentated, the palpi filiform and almost equal, the maxillæ and ligula very long, in the form of a proboscis and bent underneath, and in which the second cubital cell receives the two recurrent nervures, have been separated from them by M. Kirby under the generic name of

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(1) See Jurine, Latreille, Van der Linden, and the Encyclopédie Méthodique.

(2) See Fab., Lat., and Van der Linden.

(3) Lat., Ibid., divis. B; Van der Linden, and Dict. Class. d'Hist. Nat., article *Planiceps*.

(4) Lat., Ibid., p. 62; and Van der Linden.

AMMOPHILUS, Kirby.

To this division belongs the

A. subulosus; Sphex subulosa, L.; Panz., Faun. Insect. Germ., LXV, 12. Black; abdomen bluish-black, narrowed at base into a long, slender, and almost conical pedicle, the second ring, its base excepted, and the third, fulvous; a silvery and silken down on the front of the head in the male.

The female, with her feet, excavates a deep hole in the ground along the borders of roads, in which she deposits a caterpillar, killed or mortally wounded by her sting, laying an egg by the side of it; she then closes the hole with grains of sand, or even a small pebble. It would appear that she repeats the operation several times in succession in a similar manner, in the same nest.

A. arenarius; Pepsis arenaria, Fab.; Panz., Ibid., LXV, 13, is also an Ammophilus. Black and hairy; pedicle of the abdomen abruptly formed by its first ring, the second, third, and base of the fourth, red.

In some—the first family of *Miscus*, Jur.—the third cubital cell is petiolate superiorly(1).

Those species in which the mandibles and palpi still preserve a similar form, but where the maxillæ and labium are much shorter, and, at most, flexed at the extremity, are comprised by Latreille in the genera SPHEX, PRONÆUS, CHLORION. In

PRONÆUS, Lat.

As in Ammophilus, the second cubital cell receives the two recurrent nervures(2).

SPHEX, proper.

That cell only receives the first; the third is inserted under the other(3). In

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(1) Lat., Gen. Crust. et Insect., IV, p. 53; and Van der Linden.

(2) Lat., Ibid., 56, 57.

(3) Lat., Gen. Crust. et Insect., IV, p. 55.

CHLORION, Lat.

The first recurrent nervure is inserted under the first cubital cell, and the second under the third.

C. compressum, Fab. Very common in the Isle of France where it wages war against the Kakerlacs, provisioning its larvæ with their bodies. It is green; the four posterior thighs red.

C. lobatum. Entirely of a golden-green. In Bengal(1).

Other species, in which the mandibles are still dentated, but where the maxillary palpi are much longer than those of the labium and almost setiform, compose the genus

DOLICHURUS, Lat.(2)

The last Fossores of this third division have no dentations in the mandibles and are comprised in the genera Pelopæus, Podium, and Ampulex. These organs are striated.

AMPULEX, Jur.

Similar to Chlorion in the insertion of the recurrent nervure of the superior wings(3).

In the two other subgenera, the second cubital cell receives these two nervures. The clypeus is usually dentated.

PODIUM, Lat.

Where the antennæ are inserted beneath the middle of the anterior face of the head, and where the maxillary palpi are hardly longer than those of the labium(4). Those of

PELOPÆUS, Lat. Fab.

Are evidently longer and consist of unequal joints. The insertion of the antennæ is higher up and on a level with the middle of the eyes.

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(1) Ibid., p. 57. In this species, the first recurrent nervure is insulated at the junction of the first cubital cell with the second. For the habits of the *C. compressum*, Fab., see Sonnerat, Voy. aux Indes Orientales.

(2) Lat., Ibid., 57, 387; each of the second and third cubital cells receives a recurrent nervure.

(3) Jurine on the Hymenoptera, &c.

(4) Lat., Gen. Crust. et Insect., IV, 59.

The Pelopæi construct rounded or globular nests of earth in the interior of houses. They are formed like a spirally convoluted cord presenting on their inferior side two or three ranges of holes, so that they resemble the instrument known in France by the name of a Tinker's whistle—sifflet de chaudronnier. The holes are passages to as many cells, in each of which the Insect places the body of a Spider, Fly, &c., along with an egg; it then closes the orifice with earth. To this division belongs the

P. spirifex; Sphex spirifex, L. Black; abdominal pedicle and legs yellow. In the south of France(1).

4. In other Fossores the first segment of the thorax merely forms a simple linear and transverse border, of which the two lateral extremities are remote from the origin of the superior wings. The legs are always short or of moderate length. The head viewed from above appears transversal, and the eyes extend to the posterior margin. The abdomen forms an elongated semi-cone, rounded on the sides near its base. The labrum is entirely exposed or very salient.

I have formed these Insects into a small family called BEMBECIDES, from the genus

BEMBEX, Fab.,

Of which it is constituted. In these Hymenoptera, peculiar to hot climates, the body is elongated, pointed posteriorly, almost always varied with black and yellow or russet, and glabrous; the antennæ are approximated at base, slightly geniculate at the second joint, and enlarging towards the extremity; the mandibles are narrow, elongated, dentated on the inner side and crossed; the tibiæ and tarsi are furnished with little spines or cilia, most remarkable on the anterior tarsi of the females. We frequently find one or two teeth under the abdomen of the males. Their motions are extremely rapid; they flit from flower to flower with a sharp and interrupted hum. Several diffuse an odour of roses. They only appear in summer.

Some of them have a false proboscis, bent underneath; their labrum forms an elongated triangle.

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(1) See Fab., Lat., and Van der Linden.

Sometimes the palpi are very short; those of the maxillæ have but four joints and the labials but two. Such is the

B. rostrata; Apis rostrata, L.; Panz., Faun. Insect. Germ., I, 10. The male large, black, with transversal bands of lemon-yellow on the abdomen, the first of which is interrupted, and the others undulated. The female, which has less yellow about the head than the male, forms deep holes in the sand, where she heaps up the bodies of various dipterous Insects, particularly Syrphi and Muscæ, and lays her eggs; she then closes the opening with earth. Throughout Europe(1).

Sometimes the maxillary palpi, which are tolerably elongated, consist of six joints, and the labials of four, as in

MONEDULA, Lat.(2)

The others have no false proboscis, and the labrum is short and rounded. Such is

STIZUS, Lat. Jur.(3)

5. Other Fossores, having nearly the same appearance as those of the preceding division, differ from them in the labrum, which is either totally or partially hidden; their mandibles present a deep notch in their interior side near their base, a character which distinguishes them both from the preceding and following Insects. They are our LARRATES.

Here the superior wings have three closed cubital cells, the second of which receives the two recurrent nervures.

PALARUS, Lat.—*Gonius*, Jur.

Where the antennæ are very short and gradually enlarge; the eyes are closely approximated posteriorly and enclose the ocelli; the second cubital cell is petiolate(4).

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(1) See Lat., Gen. Crust. et Insect., IV, 97.

(2) Lat., Ibid.; most of the genus *Bembex*, Fab.

(3) Lat., Ibid.; most of the Larræ, Fab., such as the *L. vespiformis, erytrocephala, cincta, crassicornis, bifasciata, analis, ruficornis, cingulata, rufifrons, bicolor, fasciata*.

(4) See Lat, Gen. Crust. et Insect., IV, 97; and his Consid. génér. sur l'ordre des Crust. des Arach. et des Insect.

LYROPS, Illig.—*Liris*, Fab.—*Larra*, Jur.

Where the antennæ are filiform, where the third cubital cell is narrow, oblique, almost lunate, and the inner side of the mandibles offers a dentiform projection(1).

LARRA, Fab.

Hardly differs from Lyrops except in the absence of teeth on the inner side of the mandibles, the equal distance between the eyes, and the evidently longer metathorax and abdomen(2).

There, the superior wings have but two closed cubital cells, each of which receives a recurrent nervure.

DINETUS, Jur.

Where the two cubital cells are sessile. The antennæ of the males are moniliform inferiorly, and then filiform. The mandibles are tridentated on the inner side, and the radial cell is furnished with an appendix(3).

MISCOPHUS, Jur.

Where the second cubital cell is petiolate and the radial offers no appendage. The antennæ are filiform in both sexes. The inner side of the mandibles presents, at most, a slight projection(4).

6. We now come to Fossores, in which the labrum is also completely or partially hidden, where the maxillæ and labium form no proboscis, where the inner side of the mandibles exhibits no emargination, where the head is of an ordinary size, the abdomen is triangular or ovoido-conical, and becoming gradually narrower towards its extremity, and never placed on a long pedicle. The antennæ are filiform and their first joint but slightly elongated. They are our NYSSONES.

In some the eyes are entire.

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(1) Lat., Ibid., 71.
(2) Lat., Ibid., 70.
(3) Lat., Ibid., 72.
(4) Lat., Gen. Crust. et Insect., IV, 72.

Astata, Lat.—*Dimorpha*, Jur.

Where there are three closed cubital cells, all sessile, the second of which receives the two recurrent nervures; the radial has an appendix, the extremity of the mandibles are bifid, and the eyes closely approximated superiorly(1).

Nysson, Lat. Jur.

Where the superior wings also have the same number of cubital cells, but where the second is petiolate, and where the radial has no appendix. The mandibles terminate in a simple point and the eyes are distant(2).

Oxybelus, Lat. Jur. Oliv.

Where there is but one closed cubital cell, receiving a single recurrent nervure. The antennæ are short and contorted, and the second joint is much shorter than the third. The mandibles terminate in a simple point. The scutellum offers one or three dentiform points. The tibiæ are spinous, and the extremity of the tarsi presents a large pellet. The females make their nests in the sand, and provision their larvæ with the bodies of Muscides(3).

Nitela, Lat.

Likewise with but one closed cubital cell, but where the antennæ are longer, almost straight, and their second and third joints are of equal length. The mandibles terminate in two teeth; there are neither points on the scutellum nor spines on the tibiæ; the tarsial pellet is very small(4).

The eyes are emarginated in others, as in

Pison, Spin. Lat.

Three closed cubital cells in the superior wings, the second very small, petiolate, and receiving the two recurrent nervures, a character which approximates the subgenus to Nysson(1).

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(1) Lat., Ibid., 67.
(2) Lat., Ibid., 90.
(3) Lat., Ibid, 77; Encyc. Méthod., article *Oxibèle.*
(4) Lat., Gen. Crust. et Insect., IV, 77.

7. The last division of the Fossores, that of the CRABRONITES, only differs from the preceding one, inasmuch as these Insects, which usually have a very large head, almost square, when viewed from above, and their antennæ frequently largest at the extremity or clavate, have an abdomen either oval or elliptical, and widest in the middle, or narrowed at base into an elongated pedicle, and as if terminated by a club.

In some, the antennæ are inserted below the middle of the anterior face of the head; the clypeus is short and wide.

Sometimes the eyes are emarginated.

TRYPOXYLON, Lat. Fab.—*Apius*, Jur.—*Sphex*, Lin.

Where the mandibles are arcuated and dentated. The superior wings have but two closed cubital cells, each receiving a recurrent nervure, the second cell is small and less distinctly marked, as well as a third, that which is incomplete and almost reaches the tip of the wing. The abdomen is narrowed at base into a long pedicle.

T. figulus; *Sphex figulus*, L.; Jur., Hymenop., IX, 6—8. Black and glossy; the clypeus covered with a silvery, silken down. The female takes advantage of the holes excavated in old wood by other Insects, and deposits her eggs there, along with the little spiders destined to nourish her larvæ. This done, she closes the orifice with moist earth(2).

Sometimes the eyes are entire.

Here, the mandibles are narrow and merely dentated at the extremity, or terminate in a simple point, with a single tooth beneath or on the inner side. The antennæ are approximated at base.

GORYTES, Lat.—*Arpactus*, Jur.—*Mellinus*, *Oxybelus*, Fab.

Where there are three complete, sessile and almost equal cubital cells, of which the second receives the two recurrent nervures. The mandibles are moderate and unidentated on the inner side; the antennæ are rather thickest near the extremity. The metathorax presents a kind of false, sulcated or waved scutellum. The anterior tarsi are frequently ciliated and have the last joint inflated(1). In

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(1) Lat., Ibid., 75, genus *Tachybulus*; and 387, genus *Pison* of Spinola, and not of Jurine.

(2) Lat., Gen. Crust. et Insect., IV, 75.

CRABRO, Fab.

There is but a single closed cubital cell, and it receives the first recurrent nervure; the mandibles terminate in a bifid point. The antennæ are geniculate and filiform, fusiform or slightly serrated in some. Their palpi are short and almost equal; the ligula is entire. The clypeus is frequently golden or silvery, and very brilliant.

Some males are remarkable for the palette or trowel-like dilatation (even resembling a sieve) of the tibiæ, or of the first joint of their anterior feet.

The female of one species—*cibarius*—provisions her larvæ with a Pyralis that lives on the Oak. Those of others feed them with Diptera, which they amass in the holes where they lay their eggs(2).

STIGMUS, Jur.

These Insects are thus named from the largeness of the thick or callous point of the rib of the superior wings, and which forms a little black spot. They have two closed cubital cells, the first of which alone receives a recurrent nervure. The antennæ are not geniculate, their first joint being slightly elongated, and in the form of a reversed cone. The mandibles are arcuated and terminated by two or three teeth(3).

There, the mandibles, at least in the females, are strong and bidentated on the inner side. The antennæ are remote at base.

PAMPHREDON, Lat. Fab.—*Cemonus*, Jur.

Where there are two complete, sessile, cubital cells, and another imperfect one closed by the posterior edge of the wing.

One species—the unicolor—feeds its larvæ with Aphides(4).

MELLINUS, Fab. Jur.

Where there are three complete cubital cells, all sessile, and frequently the beginning of a fourth, which does not however reach the extremity of the wing; the first and the third receive, each, a recurrent nervure. The abdomen is narrowed in the manner of a pedicle widened at its base. The tarsi are terminated by a large pellet(1). In

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(1) Lat., Ibid., 88.
(2) Lat., Ibid., 80.
(3) Lat., Gen. Crust. et Insect., IV, 84.
(4) Lat., Ibid., 83, divis. I and II.

ALYSON, Jur.—*Pompilus*, Fab.

We also perceive three complete cubital cells; but the second is petiolate, and receives the two recurrent nervures. The base of the abdomen is not particularly narrowed. The terminal pellet of the tarsi is small(2).

The remaining Crabronites have their antennæ inserted higher or near the middle of the anterior face of the head; they are usually thickest at the extremity, or even clavate. They all have three complete cubital cells, and two recurrent nervures.

These Insects are connected by various characters with those of the following family.

Sometimes the clypeus is almost square. The abdomen is borne on an abrupt, long pedicle, formed by the first ring. The mandibles terminate by two teeth.

PSEN, Lat. Jur.—*Trypoxylon*, *Pelopœus*, Fab.(3)

Sometimes the clypeus is as if trilobate. The first ring of the abdomen is at most narrowed in the manner of a knot. The mandibles terminate in a simple point. The eyes are frequently somewhat emarginated.

These Insects form the genus

PHILANTHUS, Fab.

The females make their nests in sand, and bury the bodies of Bees, Andrenetæ, and even Cucurlionites, for the nourishment of their larvæ.

Other entomologists restrict this generic appellation to those species in which the antennæ are remote and abruptly inflated, in which the mandibles exhibit no projection on the inner side, and where all the cubital cells are sessile.

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(1) Lat., Ibid., 85.

(2) Lat., Ibid., 86.

(3) Lat., Gen. Crust. et Insect., IV, 91.

They are the true Philanthi, or

PHILANTHUS, Lat.—*Simblephilus*, Jur.(1)

Those, in which the antennæ are approximated, much longer than the head, and gradually enlarge; where the inner side of the mandibles presents a dentiform projection, and the second cubital cell is petiolate, form the subgenus

CERCERIS, Lat.—*Philanthus*, Jur.(2)

FAMILY III.

DIPLOPTERA.

The third family of the Aculeata is the only one of that section, in which with but few exceptions (*Ceramius*), we find the superior wings folded longitudinally. The antennæ are usually geniculate and clavate, or thickest at the end. The eyes are emarginated. The prothorax is prolonged behind, on each side, to the origin of the wings. In the superior of the latter organs are three or two closed cubital cells, the second of which receives the two recurrent nervures. The body is glabrous or nearly so, and black, more or less maculated with yellow or fulvous.

Many of these Insects form temporary communities composed of three sorts of individuals, males, females, and neuters or mules. Such of the females as survive the severity of the winter commence the nest and take care of the larvæ. They are subsequently assisted by the neuters.

We will divide the Diploptera into two tribes.

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(1) Lat., Ibid., 95. The genus *Trachypus*, Klüg, differs but little from this one. The first ring of the abdomen is proportionally more elongated, narrower, and almost forms a pedicle, as in Psen.

(2) Lat., Ibid., 93. In the Ann. d'Agricult., LIII., Bosc has published some observations on the habits of certain species of this subgenus.

The type of the first, that of the MASARIDES, Lat., is the genus

MASARIS, Fab.

The antennæ at the first glance seem to be composed of but eight joints, the eighth, with the following ones, forming an almost indistinctly articulated club, rounded or very obtuse at the end. The ligula is terminated by two threads which can be withdrawn into a tube formed by its base. There are but two complete cubital cells in the superior wings. The middle of the anterior margin of the clypeus is emarginated and receives the labrum in the notch.

MASARIS, proper.

Where the antennæ are rather longer than the head and thorax, and have their first joint elongated, and the eighth forming an obconical club rounded at the end. The abdomen is long(1).

CLEONITES, Lat.—*Masaris*, Fab. Jur.

Where the antennæ are hardly longer than the head, and have their two first joints much shorter than the third, and the eighth and following ones forming an almost globular body. The abdomen is hardly longer than the thorax(2).

A species figured in the great work on Egypt appears to form an intermediate subgenus.

The second tribe of the Diploptera, that of the VESPARIÆ, is composed of the genus

VESPA, Lin.

Where the antennæ always present thirteen distinct joints in the males and terminate in an elongated, pointed, and sometimes—in the males—hooked extremity: they are always geniculate, at least in the females and neuters. The ligula is sometimes divided into four plumose filaments, and sometimes bilobate with four glandular points at the end, one on each lateral lobe, and the remaining two on the intermediate one, which is larger, widened, and emarginated or bifid at its extremity. The mandibles are strong and dentated. The clypeus is large. Underneath the labrum is a little piece in the form of a ligula analogous to that observed by Reaumur in the Bombi, and which M. Savigny styles the *epipharynx.* With the exception of a very few species, the superior wings have three complete cubital cells. The females and neuters are armed with an extremely powerful and venomous sting. Several of them form communities composed of the three sorts of individuals.

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(1) Lat., Gener. Crust. et Insect., IV, 144.

(2) Lat., Ibid., 144.

The larvæ are vermiform, destitute of feet and enclosed separately in a cell where they sometimes live on the bodies of Insects placed there by the mother at the time she deposited the egg, and sometimes on the nectar of flowers, juices of fruits and animal matters, elaborated in the stomach of the mother or that of the neuters, who feed them daily.

M. de Saint-Hilaire brought a species from the southern provinces of Brazil, which amasses a considerable store of honey, that is sometimes poisonous, like that of our common Bee(1).

A first subgenus,

Ceramius, Lat. Klüg,

Which has been the subject of a Monograph by one of our most celebrated entomologists, Doctor Klüg, forms an exception to the general characters of this tribe in the superior wings, which are extended, and in the number of their cubital cells, of which there are but two. In addition to this, the labial palpi are longer than those of the maxillæ.

But four species are yet known, two of which are from the Cape of Good Hope, and the remainder from the south of Europe; one of these latter—the *lusitanicus*—appears to us to be allied by its natural affinities to Masaris(2).

In all the following subgenera the superior wings are folded, and present three complete cubital cells.

Sometimes the mandibles are much longer than broad, and approximated anteriorly in the form of a rostrum. The ligula is narrow and elongated; the clypeus is almost cordiform or oval, with the point anterior and more or less truncated.

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(1) Mem. du Mus. d'Hist. Nat.

(2) Lat., Consid. Gener. sur l'Ordre des Crust., des Arach., et des Insect., 329; Klüg, Entom. Monog. 219, et seq.

They are all solitary, and each species consists of *males* and *females*. The females provide for their young before they are hatched, and for the whole time that they are to remain in the state of larvæ. The nests of the latter are usually formed of earth and sometimes hidden in holes of walls, in the ground or old wood, and sometimes exposed on plants. Each of them contains caterpillars or other larvæ, killed by the sting of the mother, who heaps them up in a circle for the use of her descendants.

SYNAGRIS, Lat. Fab.

Where the ligula is divided into four long and plumose threads, without glandular points at their extremity. The mandibles of some males are very large and resemble horns.

But few species are known, and all peculiar to Africa(1).

EUMENES, Lat. Fab.

Where the ligula is divided into three pieces, glandular at the extremity, the intermediate one the largest, widened at the end, cordiform, and emarginated or bifid.

In some the abdomen is ovoid or conical, and thickest at base. Such are

PTEROCHILE, Klüg,

Remarkable for very long lips, and maxillæ forming a sort of proboscis bent underneath, and also distinguished by the labial palpi, which are bristled with long hairs, and consist of but three distinct joints(2).

ODYNERUS, Lat.

To which we may reunite the *Rygchiæ* of M. Spinola, where these parts of the mouth are much shorter, and where the labial palpi are almost glabrous, with four apparent divisions.

The female of a species of this division—*Vespa muraria*, L.; Reaum., Mem. VI, xxvi, 1—10—makes a hole in the sand or mortar in walls some inches in depth, at the orifice of which she forms an exterior tube, at first straight and then recurved, composed of an earthy paste, arranged in thick, contorted threads. In the cavity of the interior cell she places from eight to twelve little green larvæ of a similar age, resembling caterpillars, but without feet, arranging them in circular layers. Having laid an egg in it, she closes the orifice and destroys the scaffolding without(1).

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(1) *Synagris cornuta*, Lat., Gener. Crust. et Insect., IV, p. 135; Fab., Syst. Piezat.; Drury, Insect., II, xlviii, 3, the male;—*Vespa valida*, L.;—*V. hæmorrhoidalis*, Fab.

(2) Panz., Hymen., p. 146; *Vesp. phalærata*, Faun. Insect. Germ., XLVII, 21.

In the others, the first ring of the abdomen is narrow, elongated and pyriform, and the second campanulate, as in

EUMENES proper,

To which we may reunite the *Zethi*(2) of Fabricius, and the *Discœlis*(3) of Latreille.

E. coarctata, Fab.; Panz., Faun. Insect. Germ., LXIII, 12, the male. Five lines in length; black, with yellow spots; posterior margin of the abdominal annuli of the same colour; first ring of the abdomen elongated and pyriform, with two yellow dots; an oblique band of yellow on each side of the second, which is the largest of all and campanulate.

The female constructs a spherical nest of very fine earth on the stems of plants, which, according to Geoffroy, she fills with honey, and then deposits an egg(4).

Sometimes the mandibles are hardly longer than they are wide, and are broadly and obliquely truncated at the extremity; the ligula is short or but slightly elongated, and the clypeus nearly square.

These species constitute the subgenus of the Wasps, properly so called, or

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(1) See Lat., Gener. Crust. et Insect., IV, p. 139, 136; several Vespæ of Fabricius.

(2) Lat., Ibid. In EUMENES, the clypeus is longitudinal, and prolonged into a point anteriorly; the united mandibles form a long, narrow and pointed rostrum; they are proportionally shorter, and merely form an open angle in ZETHUS, here also the clypeus is as broad as it is long or broader, and has no anterior prolongation. The second cubital cell is perfectly triangular. The maxillary palpi do not extend beyond the extremity of the jaws. They are longer in DISCŒLIUS, which resembles Zethus in the form of the mandibles and clypeus. We should observe, that most of the Insects placed by Fabricius in this last genus are Polistes, in which, however, the abdomen differs from that of the ordinary species, and approximates to that of an Eumenes.

(3) Lat., Ibid.

(4) Lat., Ibid.

VESPA, POLISTES, Lat.

These Insects unite in numerous societies, composed of *males*, *females* and *neuters*. The two last detach particles of old wood or bark with their mandibles, moisten and reduce them into a pultaceous mass resembling that of paper or pasteboard, and construct combs or nests with it that are usually horizontal, and suspended above by one or more pedicles; on the inferior side is a range of vertical cells in the form of hexagonal and truncated pyramids. These cells are approximated exclusively to the use of the larvæ and nymphs, a cell to each. The number of combs that compose this nest varies. It is sometimes exposed, and at others surrounded by an envelope, pierced with a common and almost always central opening, which sometimes corresponds to a series of holes which communicate with the interior, the combs adhere to the parietes of the envelope, whether they be in the open air or concealed in the earth or hollows of trees. The figure of these structures varies according to the species.

The females commence the business alone, and lay eggs that produce neuters or labourers, which assist in enlarging the nest and taking care of the succeeding young ones. The community is solely composed of these two kinds of individuals until the beginning of autumn, at which period the young males and females make their appearance. All the larvæ and nymphs which cannot complete their ultimate metamorphosis before the month of November are put to death and dragged from their cells by the labourers, which perish along with the males on the approach of winter. Some of the females survive, and in the spring become the founders of a new colony.

Wasps feed on Insects, viands of various sorts, or fruit, and nourish their larvæ with the juices of these substances. The latter, which on account of the inferior situation of the mouths of their cells are placed with their head downwards, shut themselves up and spin a cocoon when about to become nymphs. The males never work.

In several species, that portion of the internal margin of the mandibles, which is beyond the angle and terminates it, is shorter than that which precedes the angle; the middle of the anterior part of the clypeus projects in a point. These species form the subgenus

POLISTES of Lat., Fab.(1)

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(1) Lat., Gen. Crust. et Insect., IV, p. 141. Those species, in which the abdomen is oval or elliptical, narrowed at base, and sometimes even placed on a long

Sometimes the abdomen resembles that of Eumenes properly so called, in the form of its two first annuli. Such is

P. morio, Fab.; *G. Tatua*, Cuv., Bullet. de la Soc. Philom., No. VIII; Lat., Gen. Crust. et Insect., I, xiv, 5. Entirely black and glossy. Its nest forms a truncated cone like that of the *nidulans*, but it is larger, the bottom is flat, and perforated at one of its sides, and the material is coarser. It inhabits Cayenne.

Sometimes the abdomen is elliptical or borders on an oval. Such is the

P. gallica; Vespa gallica, L.; Panz., Faun. Insect. Germ., XLIX, 22. Rather smaller than the *Vespa vulgaris;* black; the clypeus, two dots on the thorax, six lines on the scutellum, two spots on the first and second rings of the abdomen, and their superior margin as well as that of all the others, yellow; abdomen bordering on an oval, and with a short pedicle. Its nest has the form of a little tapering bouquet, and contains from twenty to thirty cells, those on the sides being the smallest. It is usually attached to the branch of a shrub.

Sometimes again the abdomen is ovoid or conical, as in

P. nidulans; Vespa nidulans, Fab.; *Guêpe cartonnière*, Reaum., Insect., VI, xx, 1, 3, 4; xxi, 1; xxii—xxiv. Small; of a silken black with yellow spots; posterior margin of the abdominal annuli of the same colour. Its nest, which is suspended to branches of trees by a ring, is composed of a fine material, and has the form of a truncated cone. The combs, of which the number augments in proportion to the population, and sometimes gives a considerable size to the nest, are circular, but concave above and convex underneath, or infundibuliform and perforated with a circular hole. They are fixed to the internal parietes of the envelope throughout the whole of their circumference. The lower one is smooth beneath or destitute of cells; its opening is the door of the nest. As fast as the population increases, these Wasps form a new floor and furnish the inferior surface of the old one with cells.

In the remaining Wasps, the superior portion of the internal margin of their mandibles, that which comes after the angle, is as long as the other part or longer. The middle of the anterior margin

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pedicle, are true Polistes. Those, in which its second ring is much larger than the others, and campanulate, and where the preceding frequently forms a clavate pedicle, are *Epipones*. The *G. Tatua* belongs to this division, as well as the honey-gathering species from Brazil previously mentioned, and the *V. nidulans*.

of their clypeus is widely truncated, and has a tooth on each side. The abdomen is always ovoidal or conical. They comprise the genus Vespa proper of Latreille.

Vespa, Lat.(1)

V. crabo, L.; *Guêpe frelon*, Reaum., Insect., VI, xviii. Length one inch; head fulvous, with a yellow front; thorax black, spotted with fulvous; rings of the abdomen blackish brown, marked with a yellow band dotted with two or three black points on its posterior margin.

It builds its nest in sheltered localities, such as garrets, barns, holes in walls and hollow trees. The nest is rounded, formed of a coarse material, and of the colour of a dead leaf. The combs, of which there are usually but few, are connected with each other by pillars or columns, the middle one much the thickest. The envelope is usually thick and friable. This species devours other Insects, particularly Bees, and robs the latter of their honey.

V. vulgaris; *G. commune*, Reaum., Ibid., XIV, 1, 7. About eight lines in length; black; front of the head yellow, with a black point in the middle; several yellow spots on the thorax, and four on the scutellum; a yellow band with three black spots on the posterior margin of the rings of the abdomen.

It constructs in the earth a nest analogous to that of the crabo, but composed of a finer substance, and with more numerous combs. The columns which support them are equal. Its envelope consists of several laminæ, arranged in bands, which overlap each other's edges.

V. media, Lat., intermediate as to size between the two preceding ones, constructs a similar nest, but attaches it to the branches of trees.

V. holsatica, Fab. This species constructs a very singularly formed nest. It is almost globular, open at top, and inclosed inferiorly in a kind of saucer. It is sometimes observed in barns, or attached to the timbers in garrets, &c., and even in hives(2).

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(1) Lat., Gen. Crust. et Insect., IV, p. 142.

(2) Lat., Ann. du Mus. d'Hist. Nat.

FAMILY IV.

ANTHOPHILA, Lat.

The fourth and last family of the Aculeata, in the faculty of collecting the pollen of flowers(1), usually possessed by the two posterior legs, presents a peculiar character which distinguishes it from all other families of Insects. The first joint of the tarsi of those legs is very large, strongly compressed, and forms a square palette or a reversed triangle.

The maxillæ and lips are most commonly very long, and compose a sort of proboscis. The ligula is most frequently shaped like the head of a lance, or resembles a very long thread, the extremity of which is downy or hairy. The larvæ feed exclusively on honey and the pollen or fecundating dust of flowers. The perfect Insect feeds on the honey of the latter only.

These Hymenoptera embrace the genus

APIS, Lin.

Which I will divide into two sections.

In the first, or that of the ANDRENETÆ, Lat., the intermediate division of the ligula is cordiform or lanceolate, shorter than its sheath, and bent underneath in some, and almost straight in others. It is composed of the genus PRO-ABEILLES, Reaumur and De Geer, or the ANDRENÆ, Fab., and the MELITES of Kirby(2).

These Insects live solitarily, and consist of but two kinds of individuals, males and females. Their mandibles are simple, or at most are terminated by two dentations; the labial palpi resemble the others, which always have six joints. The ligula is divided into three pieces, the two lateral of which are very short, and in the form of auricles. Most of the females collect the pollen of flowers with the hairs of their posterior legs, and with the aid of a little honey form it into a paste (bee-bread), with which they feed their larvæ. They excavate deep holes, and frequently in hard ground, along the borders of roads, or in the fields, in which they place this paste along with an egg; they then close the aperture with earth.

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(1) The parasitical species are not possessed of this faculty, but the form of their legs is essentially the same. They are merely destitute of hairs or brushes.

(2) Monographia Apum Angliæ, a work that has immortalized its author.

In some the middle division of the ligula is enlarged at its extremity, almost cordiform, and folded when at rest.

HYLÆUS, Fab.—*Prosopis*, Jur.

Sometimes the body is glabrous, and the second and third joints of the antennæ are almost of the same length. The superior wings present but two complete cubital cells. These Insects, being destitute of hairs, collect no pollen, and appear to deposit their ova in the nests of other Hymenoptera of this family. They are the HYLÆUS proper of Latreille and Fabricius(1).

The others have a hairy body, and the third joint of the antennæ longer than the second. The superior wings have three complete cubital cells. The females collect their stores from flowers. I distinguish them by the generic name of

COLLETES, Lat.

Such for instance is the

C. glutineux; Apis succincta, L.; or the *Abeille dont le nid est fait d'espèces de membranes soyeuses* of Reaumur, Insect., VI, xii. Small; black, with whitish hairs; those on the thorax, russet; abdomen ovoid, and the posterior margin of its annuli covered with a white down, forming bands. The male—*Evodia calendarum*, Panz.—has longer antennæ. The female makes a cylindrical hole in the ground, and smears its parietes with a gummy fluid, which may be compared to the viscid and glossy slime of a Snail. In this she piles a series of cells composed of the same material, resembling a thimble in shape, each containing an egg and some of the paste before mentioned(2).

The other Andrenetæ are distinguished from the preceding ones by the lanceolate figure of the ligula.

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(1) Lat., Gen. Crust. et Insect., IV, p. 149.
(2) Lat., Ibid.

In some this ligula is folded against the superior side of its sheath, as in ANDRENA(1), and DASYPODA, Lat.(2) The first joint of the posterior tarsi of the females of the latter subgenus is very long, and covered with long hairs, in the manner of a little feather. The superior wings in these two subgenera have but two cubital cells.

A. flessæ, Panz., Faun. Insect. Germ. LXXXV, 15; *Andrène des murs*, Reaum., Insect., VI, vi, viii, 2. Six lines in length, and with white hairs on the head, thorax, lateral margins of the last abdominal annuli, and legs; abdomen bluish-black; wings black, with a tinge of violet.

The female excavates holes in tenacious sand, at the bottom of which she deposits a portion of honey, of the colour and consistence of a black and oily grease; it has a narcotic odour. Common in the environs of Paris.

In the others the ligula is straight, or slightly bent under at its extremity. Such are SPHECODES(3), HALICTUS(4), and NOMIA, Lat.(5) Here also the maxillæ are more strongly geniculate than in the Andrenæ. There are always three closed cubital cells.

The male Sphecodes have knotted antennæ; their ligula, as well as that of the females, is almost straight, and its divisions are nearly equal in length; that in the middle is much longer in Halictus and Nomia. The female Halicti have a longitudinal cleft at the posterior extremity of the abdomen. The thighs and tibiæ are inflated or dilated in the male Nomiæ.

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(1) Lat., Gener. Crust. et Insect., IV, 150. The species which in my Gener. Crust. et Insect., p. 151, I have called *lagopus*, and three others from the Cape of Good Hope, being removed from the ordinary Andrenæ by the number of their complete cubital cells, which is but two instead of three, as well as by some other characters, have been erected by Messrs Lepeletier and Serville—Encyc. Méthod. —into a new genus to which they have given the name of SCRAPTER.

(2) Lat., Ibid.

(3) Lat., Ibid., Messrs Lepeletier and Serville have formed a new genus—Encyc. Méthod.—allied to Sphecodes, under the denomination of RHATHYMUS—formerly *Colax*—but differing from it in the projection of the scutellum, and in the third cubital cell, which receives the two recurrent nervures. Besides this, the hooks of the tarsi are entire. They quote but one species, which is found at Cayenne.

(4) Lat., Ibid. For the habits of these Insects, see the excellent Memoir of M. Walckenaer, quoted under the article *Meloë*.

(5) Lat., Ibid. See Encyc. Méthod., article Nomie.
The tenth volume of the part relative to Insects of this important work also contains several other articles by Messrs Lepeletier and Serville, respecting the Insects of this family. We would particularly notice that of the *Parasites*. Some of them go to establish new genera, but as we have not been able to compare their characters with sufficient care, we are compelled to omit or barely mention them.

The second section of the Anthophila, that of the Apiariæ, Lat., comprises those species in which the mediate division of the ligula is at least as long as the mentum or its tubular shield, and is filiform or setaceous. The maxillæ and labium are much elongated and form a sort of proboscis which, when at rest, is geniculate and bent under.

The two first joints of the labial palpi most frequently resemble a squamous and compressed seta that embraces the sides of the ligula; the two others are very small; the third is generally inserted near the exterior extremity of the preceding one which terminates in a point.

The Apiariæ either live solitarily or form communities.

The former never consist of more than the ordinary number of individuals, and each female provides singly for her young. The posterior legs of their females are neither furnished with a brush on the inner side of the first joint of the tarsi, nor with a particular depression on the exterior side of their tibiæ; this side, as well as the same of the first joint of the tarsi, is most commonly and densely covered with hairs.

A first division of these solitary Bees is composed of those species in which the second joint of the posterior tarsi of the females is inserted in the middle of the extremity of the preceding one; the exterior and terminal angle of the latter does not appear to be dilated or to project more than in the interior, in the following subgenera. We may also abstract from this group certain species—*Andrenoides*—which approximate to those of the last of the preceding subgenera in their labial palpi, composed of six slender, linear joints, placed end to end, and almost precisely similar to those of the maxillary palpi. The labrum is always short. The abdomen of the females is destitute of a brush; but their posterior legs are pilose or furnished with tufts of hairs which enable them to collect the pollen of flowers.

Some have narrow mandibles, contracted near the extremity, and, as well as the labrum, smooth and terminated in a point.

Systropha, Illig.

Where the mandibles have one dentation under the point, where there are three complete cubital cells, and the extremity of the antennæ is curled in the males(1).

Rophites, Spin.

Where the mandibles are also dentated, but in which we find but two complete cubital cells; the antennæ are not contorted in both sexes(2).

Panurgus, Panz.

Where the mandibles are not dentated. The stem of the antennæ, from the third joint, in the females, forms a sort of fusiform or elongated and almost cylindrical club, thinned at base. But two cubital cells in the superior wings(3).

The mandibles of the females, in the others, are almost in the form of the bowl of a spoon, very obtuse, carinated or sulcated, and bidentated at the extremity. The labrum is extremely hard and ciliated superiorly. The antennæ are strongly geniculate and filiform. The superior wings have three complete cubital cells, the first intersected by a little transparent line, the second triangular, and the third the largest and receiving the two recurrent nervures.

Xylocopa, Lat. Fab.

Commonly called *Abeilles perce-bois, Menuisières*, &c. The Xylocopæ are related in many points to the Megachiles, and more particularly to the Osmiæ. They resemble large Bombi. Their body is usually black, sometimes partially covered with a yellow down; the wings are frequently violet, cupreous or green, and brilliant. The male, in several species, differs considerably from the female. Their eyes are large and approximated superiorly. Their anterior legs are dilated and ciliated.

X. violacea, L.; Reaum., Insect., VI, v, vi. About one inch in length; black, with violet-black wings; a russet ring round the antennæ of the male. The female bores a long vertical hole in the body she has selected, usually old dry wood exposed to the sun, and parallel to its surface. It is divided into several cells by horizontal septa formed with agglutinated raspings of wood. She then, commencing with the lowest, deposits an egg and some paste in each of them. She sometimes bores three canals in the same piece of wood.

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(1) Lat., Gener. Crust. et Insect., IV, 156.

(2) Lat., Ibid., 161; and the Nouv. Dict. d'Hist. Nat. 2d edition.

(3) Lat., Ibid., 157; and Encyc. Méthod., article *Panurge*.

They are peculiar to warm climates(1).

The labial palpi of the other Apiariæ are in the form of squamous setæ; the two first joints, compared with the two last, are very large, compressed, scaly, and have a membranous or transparent margin. The maxillary palpi are always very short, and frequently consist of less than six joints. The labrum, in a great number, is elongated and inclined on the mandibles, sometimes forming a long square and sometimes an elongated triangle.

The Apiariæ, which in our work on the natural families of the animal kingdom we have collectively designated by the name of *Dasygastræ*, are remarkable—as intimated by that name—for the numerous, short, crowded hairs, forming a silky brush, that almost always(2) covers the abdomen of the females. The labrum is as long as it is wide or longer, and square. The mandibles of the females are strong, incisive, triangular and dentated. The paraglossæ are always very short, squamous, and pointed at the extremity.

Of all the subgenera of this little group, that which appears to us to approximate most closely to the Xylocopæ, and which alone presents maxillary palpi consisting of six joints, and wings furnished with three complete cubital cells, is the

CERATINA, Lat. Spin. Jur.—*Megilla*, *Prosopis*, Fab.

The body is narrow and oblong; the antennæ are inserted in little fossulæ, and terminated almost in an elongated club; the mandibles are sulcated and tridentated at the extremity; the abdomen approaches to an oval, and is destitute of a silky brush. The labrum is proportionally shorter than in the following subgenera, where it forms an elongated quadrilateral. According to the curious observations of M. Maximilian Spinola—Ann. du Mus. d'Hist. Nat.—the habits of the females are the same as those of the Xylocopæ(3).

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(1) Lat., Gener. Crust. et Insect., IV, 158. To this subgenus, until we have further examined it, we refer the genus *Lestis* of Messrs Lepeletier and Serville—x, 795.

(2) The Ceratinæ, Stelides and Cœlioxydes, although destitute of a ventral scopa, should make part of this group, on account of the form of the labrum and mandibles, and other general characters.

(3) Lat., Gener. Crust. et Insect., IV, 160. See also the article *Cératine* of the second edition of the Nouv. Dict. d'Hist. Nat.

All the remaining Dasygastræ have four joints at most in their maxillary palpi, and two complete cubital cells.

We first remark those species in which the under part of the abdomen is evidently furnished with a silky brush.

CHELOSTOMA, Lat.

Where the body is elongated, and almost cylindrical; the mandibles project, are narrow, arcuated, and forked or emarginated at the end; the maxillary palpi are triarticulated(1).

HERIADES, Spin.

Where the body is also elongated and almost cylindrical, but where the mandibles are triangular, the maxillary palpi consist of but two joints, and the second of the labial is much shorter than that of the others. These Insects, like the Chelostomæ, make their nests in holes of old trees(2). In the four following subgenera, the abdomen is shorter and almost triangular or forms a semi-oval. These Apiariæ are the *Abeilles maçonnes* and the *Abeilles coupeuses de feuilles* of Réaumur.

MEGACHILE, Lat.—*Anthophora*, *Xylocopa*, Fab.—*Trachusa*, Jur.

Where the maxillary palpi consist of two joints; the abdomen is plane above and susceptible of being elevated posteriorly, thereby enabling the females to employ their sting over their body.

M. murarium; Xylocopa muraria, Fab.; Réaum., Insect., VI, vii, viii, 1—8. One of the largest species of the genus. The female is black, with violet-black wings. The male is covered with russet hairs, and the last of his abdominal annuli are black. The female constructs her nest of very fine earth, which she forms into a kind of mortar, applying it against walls or stones, with a south exposure. It becomes extremely hard and resembles a clod of earth. It contains from twelve to fifteen cells, in each of which is deposited some bee-bread and an egg. The perfect Insect appears in the spring of the next year.

Another species, closely allied to the preceding one—*Apis*

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(1) Lat., Ibid., 162.

(2) Lat., Gener. Crust. et Insect., IV, 162.

sicula, Ross.—forms its nest into a ball and places it on the branches of plants.

Others, Megachiles, called by Réaumur *Abeilles coupeuses de feuilles*, in the construction of their nests, employ perfectly oval or circular portions of leaves, which they cut out by means of their mandibles, with as much quickness as dexterity. These pieces are transported by them into straight and cylindrical holes, previously excavated in the ground, and sometimes in walls or the decayed trunk of an old tree. They line the bottom of the cavity with these leaves, and form a cell, shaped like a thimble, in which they deposit the honied provision on which the larva is to feed, and an egg; they then close the cell with a flat or slightly concave lid, also formed of a portion of a leaf. A second cell is subsequently formed above the first, that is followed by a third, and so on until the hole is filled. Of this number is the

M. rosæ; *Apis centuncularis*, L.; Réaum., Insect., VI, x. About six lines in length; black, with a fulvous-grey down; small white and transverse spots on the superior sides of the abdomen; inferior surface of the latter covered with fulvous hairs. The male is described by Linnæus as another species, under the name of *lagopoda*.

Other analogous species attack the leaves of the Oak, Elm, &c., for a similar purpose(1).

LITHURGUS, Lat.

Where there are four joints in the maxillary palpi, as in the following subgenus, but the abdomen is depressed superiorly. All the joints of the labial palpi are placed end to end(2), and the palpi themselves resemble long squamous setæ, terminating in a point. The mandibles are narrow in both sexes, and their extremity is emarginated in the middle or bidentated. The females have a rounded projection in the middle of their head(3).

OSMIA, Panz.—*Anthophora*, Fab.—*Trachusa*, Jur.

Where the maxillary palpi are formed of four joints, or at least of three very distinct ones, and the abdomen is convex above. Some are *masons*, and frequently have two or three horns on the clypeus, which appear to be of use to them in the construction of their nests. They conceal the latter in the ground, holes in walls, doors and old wood, and sometimes even in the shells of Helices, employing an earthy mortar for their construction. They are generally pilose, and appear early in the spring. The antennæ of the males are usually long. Others employ the petals of flowers, and form cells with the cut portions, in the manner of the leaf-cutters. The *Abeille tapissière* of Réaumur forms its cells with the petals of the wild Poppy, and sometimes of the Rape(1). Others again form their nests in the galls of trees(2).

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(1) Lat., Gener. Crust. et Insect., IV, 165.

(2) The third joint is usually inserted on the outer side of the second, anterior to its point, and with the second forms a little oblique and lateral stem.

(3) *Centris cornuta*, Fab., and an undescribed species from the Isle of France.

ANTHIDIUM, Fab.

Where the abdomen is also convex, but the maxillary palpi are uniarticulated. The females form their nests with the down of plants(3).

The two last subgenera of the Dasygastræ approach the following ones in the absence of a silken brush, a fact which would lead us to suppose that these Insects are equally parasitical; but their labrum is parallelogramical, and their mandibles are triangular and dentated. The maxillary palpi are very short and biarticulated.

STELIS, Panz.

The scutellum destitute both of spines and teeth. The abdomen is nearly semi-cylindrical, convex above, and curved at the extremity(4).

CŒLIOXYS, Lat.

Where the scutellum has two teeth or spines, and the abdomen is triangular, plane above, prolonged into a point at the extremity in the females, and usually dentated in the males.

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(1) This species, with all those in which the mandibles are tridentated, forms the genus ANTHOCOPA of M. Lepeletier. See Encyc. Méthod., article *Rophyte*. The Osmiæ properly so called have but two teeth in each mandible.

(2) Lat., Gener. Crust. et Insect., IV, 164; and the Encyc. Méthod., article *Osmie*.

(3) Lat., Ann. du Mus. d'Hist. Nat., XIII.

(4) Lat., Gener. Crust. et Insect., IV, 163. See particularly the Encyc. Méthod., article *Stélide*.

These Insects approach the Megachiles, whilst the Stelides are connected with the Anthidia(1).

Other Apiariæ, the *Cuculinæ*, similar to the preceding ones in their posterior tarsi, and in which, as in the latter subgenera, the labial palpi have the form of squamous setæ, and the abdomen is destitute of a brush in both sexes; that are parasitical, like the Cœlioxydes and Stelides; sometimes almost glabrous and similar in colour to Wasps, and sometimes pilose in patches, have an elongated and truncated, or short and almost semicircular labrum, and narrow, pointed mandibles, unidentated at most on the inner side. The paraglossæ are frequently long, narrow, and setaceous. The scutellum in several is emarginate or bidentated; in others it is tuberculous. They are the *Nomadæ* of Fabricius. Several of these Insects appear early in the spring, flitting near the earth or about walls exposed to the sun, in order to deposit their eggs in the nests of other Apiariæ. It is this habit, analogous to that of the Cuckoo, which induced me to name them Cuculinæ.

In some, almost always glabrous, the paraglossæ are much shorter than the labial palpi.

Sometimes the labrum forms an elongated triangle truncated at the end, and inclined above the mandibles. There are never more than two complete cubital cells.

AMMOBATES, Lat.

Where the maxillary palpi are formed of six joints(2).

PHILEREMUS, Lat.—*Epeolus*, Fab.

Where these organs have but two joints(3).

Sometimes the labrum is short, and almost semicircular or semi-oval.

EPEOLUS, Lat. Fab.

Three complete cubital cells, and the maxillary palpi uniarticulated(4).

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(1) Lat., Gen. Crust. et Insect., IV, 166.
(2) Lat., Ibid, 169.
(3) Lat., Ibid., Idem.
(4) Lat., Gener. Crust. et Insect., IV, 171.

NOMADA, Fab.

The same number of cubital cells, but the maxillary palpi are formed of six joints(1).

PASITES, Jur.—*Nomada*, Fab.

But two complete cubital cells. Their maxillary palpi are quadriarticulated(2).

The other Cuculinæ, in which the body is densely pilose in patches, the scutellum is often spinous, and where there are always three complete cubital cells, are removed from the preceding Apiariæ, and approximated to the following ones by the length of their paraglossæ, or lateral divisions of the labium, which almost equals that of the labial palpi.

MELECTA, Lat.—*Crocisa*, Jur.

Where the maxillary palpi have five or six distinct joints(3).

CROCISA, Jur.

Where they have but three, and where the scutellum is prolonged and emarginated(4).

OXÆA, Klüg.

Where the labrum forms a long square, and is not semi-oval as in the preceding subgenera, and where the maxillary palpi are wanting, or at least reduced to one very small joint(5).

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(1) Lat., Ibid., 169.

(2) Lat., Ibid., 170.

(3) Lat., Ibid., 171. For some other analogous genera, see the Encyc. Méthod., articles *Parasites* and *Philérème*.

(4) Lat., Ibid., 172.

(5) Lat., Ibid., 172; Encyc. Méthod., article *Oxyée*.

The genus described by Messrs Lepeletier and Serville, under the name of *Monœca*, belongs to the division of the solitary *brush-footed* Apiariæ, but I have not yet been able to verify its characters. The mandibles are narrow, pointed and bidentated. The radial cell is appendiculated. Each of the second and third cubitals receives a recurrent nervure. The posterior tibiæ are terminated by two

The last of the solitary Apiariæ have the first joint of their posterior tarsi dilated inferiorly on the outer side, so that the following joint is inserted nearer the inner angle of the extremity of the preceding one than to the opposite angle. The outer side of this first joint, as well as that of the tibiæ, is densely crowded with thick hairs forming a sort of brush or tuft, particularly in certain species foreign to Europe, and thence the term *Scopulipedes*, which in my Fam. Nat. du Règn. Anim., I have given to this last division of the solitary Apiariæ. The under part of their abdomen is naked, or at least destitute of a silken brush. The number of cubital cells, with the exception of a few species, is three, of which each of the two last receives a recurrent nervure.

Sometimes the maxillary palpi consist of from four to six joints.

In these, the mandibles exhibit one tooth at most on the inner side. They fly with a hum from flower to flower, and with great rapidity. Several males have a bundle of hairs on the first and last joint of the intermediate tarsi. Others are distinguished from their females either by their long antennæ, or by a more remarkable thickening of the two thighs of the second pair of legs, or by that of the two last. The anterior extremity of their head is frequently coloured with yellow or white. The outer side of the tibiæ and of the first tarsial joint of the posterior legs, in the females, is often densely pilose. They construct their nests either in the ground or in the cracks and holes in old walls. Several prefer grounds cut perpendicularly and exposed to the sun. The cells, in which they deposit their eggs, are formed of earth and shaped like a thimble, or those of the Megachiles, and extremely smooth internally. They close the opening with the same material.

Those species, in which the two lateral divisions of the ligula are as long as the labial palpi and setaceous, and where the males have long antennæ, form the subgenus *Eucera* proper. M. Spinola, under the generic name of MACROCERA, has separated from it certain species in which the maxillary palpi have but five distinct joints, and the superior wings but two cubital cells.

The MELISSODES, Lat., are American Euceræ with but four joints in their maxillary palpi. They have three cubital cells.

E. longicornis; *Apis longicornis*, L.; Panz., Faun. Insect. Germ., fascic., LXIV, 21, the male; LXXVIII, 19, and LXIV, 16, the female. The male is black; labrum and anterior extremity of the head yellow; its superior portion, thorax, and

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spines, the inner one serrated. This subgenus approaches Macrocera and Epicharis.

two first abdominal annuli are covered with a russet-down; antennæ black and somewhat longer than the body. The antennæ of the female are short; the maxillæ and labium project slightly at base, the abdomen is marked with grey stripes, and the anus is russet. She appears in the very beginning of spring(1).

In the other Apiariæ of this subdivision, the paraglossæ are much shorter than the ligula; they always exhibit three cubital cells.

In some, the maxillary palpi evidently consist of six joints, as in

MELITTURGA, Lat.

Where the antennæ are short and terminated in a club in the males. All the joints of the palpi are continuous and in the same direction(2).

ANTHOPHORA, Lat.—*Megilla*, *Centris*, Fab.

Where the antennæ are filiform in both sexes, and the two last joints of the labial palpi form a little oblique stem. The

A. parietine, Ann. du Mus. d'Hist. Nat., III, builds her nest in walls, and constructs a perpendicular and slightly curved tube at its entrance of grains of earth.. Having deposited her eggs, she destroys it, or perhaps employs it in closing up the entrance(3).

In others, the maxillary palpi consist of but five joints, and those of the labial palpi are continuous. This is what distinguishes the

SARAPODA, Lat.(4)

Finally, others have but four joints in these maxillary palpi. The first joint of the posterior tarsi of the males is very large, curved, and arched or concave at its internal extremity. A stout, dentated spine is observable at the same end of the posterior tibiæ of the females.

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(1) Lat., Gen. Crust. et Insect., IV, 173.
(2) Lat., Ibid., 173.
(3) Lat., Ibid., 173.
(4) Lat., Gen. Crust. et Insect., IV, p. 173.

ANCYLOSCELIS, Lat.(1)

In those, the mandibles are pluridentated on the inner side; the maxillary palpi, as in the preceding subgenus, consist of but four joints.

CENTRIS, Fab.

The species of this subgenus are only found in America(2).

Sometimes the maxillary palpi have but a single and very small joint which in some even becomes invisible. The paraglossæ are very short, and the mandibles dentated.

EPICHARIS, Klüg.—*Centris*, Fab.

Where the last joints of the labial palpi are in the same direction as the preceding ones, are rather indistinct and form the point of those organs which resemble very elongated setæ. The second and third cubital cells receive, each, a recurrent nervure(3).

ACANTHOPUS, Klüg.—*Xylocopa*, Fab.

Where the two last joints of the labial palpi form a small, oblique and lateral stem; the third cubital cell receives the two recurrent nervures.

The internal extremity of the two posterior tibiæ presents two strong dentated spines(4).

The last of the Apiariæ form communities composed of *males* and *females*, and a considerable number of *neuters* or *labourers*. In the internal face of the posterior tibiæ—*la palette*—of these latter individuals is a smooth depression—*la corbeille*—in which they place the pellet of pollen collected with the silken down or brush attached to the inner side of the first joint of the tarsi—*la pièce carée*—of the same leg. The maxillary palpi are very small and formed of a single joint. The antennæ are geniculate.

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(1) Insects brought from Brazil by M. de Saint-Hilaire. My genus *Mèlitome*, Fam. Nat. du Règn. Anim., originally formed with female Ancyloscelides, must be suppressed. That of the *Tetrapedia*, Klüg, perhaps re-enters the preceding one.

(2) Lat., Ibid., 177. According to Messrs Lepeletier and Serville, the *Ptilotopi*, Klüg, are true *Centres*.

(3) Lat., Ibid., 178.

(4) Lat., Ibid., 178.

Sometimes the posterior tibiæ are terminated by two spines, as in

Euglossa, Lat. Fab.

Where the labrum is square, and the pseudo-proboscis is as long as the body; the labial palpi terminate in a point(1), formed by the two last joints.

Bombus, Lat. Fab.

Where the labrum is transversal, the pseudo-proboscis is much shorter than the body, and the second joint of the labial palpi terminates in a point, bearing the two others on its outer side.

The vulgar name of these Insects, or Bourdons, is applied (in France) to the males of the domestic Bee, but the Insects of which we are now speaking are much larger, more rounded, and covered with hairs frequently arranged in variously coloured bands. They are well known to children, who frequently put them to death in order to obtain the honey contained within their body. They inhabit subterranean nests in communities of fifty or sixty, and sometimes of two or three hundred individuals. The society is dissolved on the approach of winter. It is composed of *males*, distinguished by their small size, reduced head, narrow mandibles, bearded, and terminated by two teeth, and frequently by a difference of colours; of *females*, which are larger than the others, furnished with mandibles formed like a spoon, as is also the case with those of the *neuters* or *labourers;* the latter, as to size, are intermediate between the males and females; Reaumur however says that there are two varieties; the first, stronger and of a moderate size, and the second, smaller, which appeared to him to be the most lively and active. Huber, Jun. has verified this fact. According to him, several of the labourers which are hatched in the spring copulate with the males that have proceeded from their common mother, and lay soon after, but producing males only, which are to fecundate the ordinary females, or those which appear late in the season, and are destined to establish a new colony in the spring of the ensuing year. All the others, the little females not excepted, perish.

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(1) Even in those species where the body is almost glabrous, such as the *dentata, cordata*, &c., the posterior face of the first joint of the two last tarsi is still furnished with a brush. The habits of these Insects are unknown to us. Some individuals differ from others by the anterior convexity or thickening of their posterior tibiæ, where we also remark, near the outer margin, a cleft or narrow and longitudinal fossula. The genus Aglae of Lepeletier and Serville—Encyc. Méthod., Insect., X, 105—appears to have been established on similar individuals. See Lat., Ibid. These Apiariæ are peculiar to South America.

Such of the ordinary females as have escaped the severity of the winter take advantage of the first fine weather to construct their nests. One species—*Apis lapidaria*—establishes itself on the surface of the earth under stones, but all the others form their habitation in it, frequently descending to a depth of one or two feet, in the way we are about to describe. Dry plains, fields, and hills are the localities they select. These subterranean cavities, which are of considerable extent and wider than high, have the figure of a dome. The ceiling is constructed with earth and with moss, carded by these Insects, which they transport there, fibre by fibre, entering the cavity backwards. A coating of coarse wax is laid over its walls. Sometimes a simple opening, designedly left at the bottom of the nest, serves for an entrance, and then again a winding passage covered with moss, and a foot or two long, leads to the domicil. The bottom of the cavity is lined with a layer of leaves, for the accommodation of the brood. The females first place brown, irregular, mammiliform masses of wax there, called *patée* by Reaumur, and which, on account of their shape and colour, he compares to truffles. Their internal cavities are destined to enclose the eggs and larvæ. There the latter live in society until the moment has arrived when they are to become nymphs; they then separate and spin ovoid and silken cocoons, laid vertically against each other. In this state the Insect is always reversed, or, like the female nymphs of the common Bee, with the head downwards; we always find these cocoons perforated inferiorly, when the perfect Insects have left them. Reaumur says that the larvæ feed on the wax which forms their dwelling; according to Huber, it merely protects them from cold and wet, their aliment consisting of a tolerably large quantity of pollen moistened with honey, with which the labourers carefully supply them; when it is consumed they perforate the cover of their cells, furnish them with more, and shut them up again. They even enlarge them when the increased growth of the larvæ causes them to be too much confined. We also find in these nests three or four small bodies composed of brown wax, or the same matter as the patée, and shaped like tumblers or almost cylindrical pots, always open, and more or less filled with good honey. These reservoirs of the honey are not always placed in the same situation. It has been asserted that the labourers employed the empty cocoons for a similar use, but this I doubt, as they are of a silken material and perforated inferiorly.

The larvæ are hatched in four or five days after the eggs have been laid, and complete their metamorphosis in the months of June and

July. The labourers remove the wax that clogs their cocoon to facilitate their issue. It was formerly supposed that they produced labourers only, but we have already seen that some males are among them, whose functions have been indicated. These labourers assist the female in her work. The number of cells which serve as habitations to the larvæ and nymphs increases, and they form irregular combs placed in stories, on the edges of which we particularly observe the brown patée of Reaumur. According to Huber, the labourers are extremely fond of the ova of the female, and sometimes, in her absence, even break open the cells in which they are deposited, in order to suck the milky fluid they contain! a most extraordinary fact, which seems to belie the known attachment of the labourers for the germs of that race of which they are the protectors and guardians. The wax produced by them, according to this same naturalist, has the same origin as that of our domestic Bee, or is merely elaborated honey that also transudes through the intervals of some of the abdominal annuli. Several females live amicably together under one roof and exhibit no symptoms of aversion for each other. They copulate abroad, either in the air or on plants, where I have seen them thus united. The females are much less prolific than those of our domestic Bee.

The following species are common in the environs of Paris.

B. muscorum; Apis muscorum, L.; Reaum., Insect., VI, ii, 1, 2, 3, yellowish; hairs of the thorax fulvous. The same colours in all the individuals.

B. lapidarius; Apis lapidaria, L.; Reaum., Ibid., I, i, 4. The female is black, with a reddish anus and colourless wings. The male—*Bombus arbustorum*, Fab.—has the front of the head and the two extremities of the thorax yellow. The anus is red as in the female. This species makes its nest under piles of stones.

B. terrestris; Apis terrestris, L.; *B. souterain*, Reaum., Ibid., III, i. Black; posterior extremity of the thorax and base of the abdomen yellow; anus white(1).

Sometimes the social Apiariæ have no spines at the extremity of their posterior tibiæ.

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(1) For the other species, see the Memoir of M. Huber, Lin. Trans., VI; Jurine on the Hymenoptera, genus *Breme*, and Panzer on the same order of Insects. With respect to their male organs of generation, see the Memoir of Lachat and Audouin.

They form two subgenera:

Apis, Lat.

Or that of Bees properly so called, where the first joint of the posterior tarsi of the labourers forms a long square, and is furnished on the inner side with a silken down divided into transverse or striated bands.

Apis mellifica, L.; Reaum., Insect., V, xxi—xxxviii. Blackish; scutellum and abdomen of the same colour; a transverse greyish band, formed of down, at the base of the third and following abdominal annuli.

Bees proper are much smaller and more oblong than the Bombi. Their body is merely furnished with down in particular places, and its colours vary but little. Their communities consist of *labourers* or *neuters*, usually from fifteen to twenty thousand in number, and sometimes extending to thirty thousand; of from six to eight hundred *males*, and in some hives of a thousand and more, called *bourdons* by the French Apiarists(1), and *faux-bourdons* by Reaumur; and commonly of a single *female*, considered by the ancients as the king or head of the community, and styled a queen by us.

The *labourers*, smaller than the others, have their antennæ composed of twelve joints, and the abdomen of six annuli; the first joint of the posterior tarsi, or the *square piece* (*piece carrée*), is dilated in the form of a pointed palette, at the exterior angle of their base, and densely covered on its inner side with short fine, silky down; they are armed with a sting. The *female* presents the same characters, but the abdomen of the labourers is shorter. Their mandibles are spoon-shaped, and not dentated. In the outer side of their posterior tibiæ is that smooth depression edged with hairs called the *corbeille* or basket; the silky brush of the first joint of the tarsi of the same legs has seven or eight transverse striæ.

The males and females are the largest; their mandibles are hairy and emarginated under the point; the proboscis is shorter, particularly in the males. These latter differ from the former and from the labourers in their antennæ, which consist of thirteen joints; in their more rounded head and larger eyes, elongated and united above; in their smaller and more hairy mandibles, in the absence of a sting, in the four short anterior legs, of which the two first are arcuated, and finally in the *piece carrée* which has neither palette nor silken brush. Their sexual organs resemble two horns, partly of a reddish yellow, accompanied by a penis terminated en palette, and some other parts. If these organs be forcibly protruded the Insect dies instantly.

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(1) Or our *Drone*. *Am. Ed.*

The interior of the abdominal cavity of the females and labourers presents two stomachs, the intestines, and poison sac. A tolerably large aperture situated at the superior base of the proboscis, under the labrum, and closed by a little triangular piece called *langue* by Reaumur, the *epipharynx* of Savigny, transmits the aliment and leads to a slender esophagus that traverses the interior of the thorax, and thence passes to the anterior stomach, or rather crop, which contains the honey. The following stomach, according to Reaumur, contains the pollen or wax-like matter, and has its surface marked by annular and transverse rugæ, in the manner of hoops. This abdominal cavity in the females contains two large ovaries composed of numerous sacculi, each of which encloses from sixteen to seventeen eggs. Each ovary terminates at the anus, near which it dilates into a pouch, where the egg is arrested, and receives a viscid humour furnished by a neighbouring gland. According to the observations of Huber, Jun., the inferior semi-annuli of the abdomen of the labourers, the first and last excepted, have each, on their internal surface, two pouches in which the wax is secreted and moulded into laminæ, that afterwards ooze out through the intervals between the rings. Under these pouches is a particular membrane formed of a very small network, with hexagonal meshes, that unites to the lining membrane of the abdominal cavity.

These observations on the internal anatomy of the Bee, with the exception of some few modifications, will apply to the Bombi properly so called(1). Wax, according to the experiments of the same naturalist, is nothing more than elaborated honey, and the pollen mixed with a little of that substance only serves as food for these Insects and their larvæ.

M. Huber distinguishes two kinds of labourers or working Bees. The first, which he calls *cirières*, collect provisions and all the materials requisite for building, and employ the same. The second, or the *nourrices* (*nurses*), smaller and weaker, are formed for retirement, and their functions are almost reduced to the rearing of the young, and the internal economy of the hive.

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(1) I have also verified this fact. See my Memoir on this subject in the Ann. du Mus. d'Hist. Nat.

We have seen that the labourers or working bees resemble the females in several particulars. Certain curious experiments have proved that they are of one sex, and that they may become mothers, if, when in their state of larvæ and three days after they are hatched, they receive a peculiar kind of aliment or that which is given to the queen-larvæ. But even then they can only acquire all the faculties of the latter by being placed in a larger cell or one similar to that of the larvæ of the female proper, the royal cell. If fed in this way in their own cell, they can only produce males, and differ from the females proper by being smaller. The labourers then are merely females whose ovaries have not been developed in consequence of the nature of the food given to them while in the state of larvæ.

The substance of which their combs are composed, being ill adapted to resist the effects of the weather, and as they do not construct a nest or general envelope, these Insects can only establish their colonies in cavities where their work finds a natural shelter. The labourers, which are alone charged with the work, form those laminæ composed of two opposing rows of hexagonal alveoli with a pyramidal base formed of three rhombs. These alveoli have received the name of *cells*, and each lamina that of *comb*. They are always perpendicular, parallel, fixed at top or by one of the edges, and separated by spaces which allow the Bees to pass between them. The cells are thus placed horizontally. Distinguished geometricians have demonstrated that their form is the most economical with respect to the expenditure of wax, and the most advantageous as to the extent of the space contained in each cell. Bees, however, know how to modify this form according to circumstances. They cut away and fit their faces piece by piece. These cells, with the exception of that proper to the larva and nymph of the female, are almost equal; some contain the brood, and the remainder the honey and pollen of flowers. Some of the cells containing honey are open, and the remainder, or those held in reserve, are sealed up with a flat or slightly convex lid. The royal cells, which vary in number from two to forty, are much larger, almost cylindrical, somewhat narrower at the end, and have little cavities on their external surface. They usually hang from the margin of the combs, in the manner of stalactites, so that the larvæ contained in them are in a reversed position. Some of them weigh as much as one hundred and fifty of the ordinary cells. The cells of the males are of an intermediate size, between those of the preceding and those of the labourers, and placed here and there. Bees always continue their combs from above downwards. They stop the little chinks and apertures of their domicil with a species of mastich, which they collect from different trees, called *propolis.*

Copulation takes place in the beginning of summer out of the hive, and, according to M. Huber, the female returns to it with the genital organs of the male attached to the extremity of her abdomen. It is thought that this single fecundation vivifies all the eggs she may lay in the course of two years, and perhaps during the whole of her life. She produces the different batches in rapid succession, and does not cease laying till autumn. Réaumur estimates the number laid by a female in the spring during the space of twenty days at twelve thousand. Guided unerringly by her instinct she makes no mistake in selecting their appropriate cells. Sometimes, however, as where the total number is not sufficient, she places several eggs in one. The labourers subsequently make a selection. All those which she lays in the ensuing spring produce labourers and are hatched in four or five days.

Bees take care to furnish their larvæ with patée in quantities proportioned to their age, and on which they cling with their bodies curved into an arc. Six or seven days after they are hatched, they prepare to undergo their metamorphosis. Shut up in their cells by the labourers who close the orifice with a convex lid, they line the parietes of their domicil with a tissue of silk, spin a cocoon, become nymphs, and, at the expiration of about twelve days, issue forth in their perfect state. The labourers immediately clean out the vacant cells, in order that they may be prepared for the reception of another egg. This is not the case however with the royal cells; they are destroyed and new ones constructed if necessary. The eggs containing males are produced two months later, and those of the female soon after the latter.

This succession of generations forms so many particular communities, prepared to form new colonies, and known by the name of *swarms.* A single hive sometimes produces three or four; but the last are always small. Those which weigh from six to eight pounds are the best. Finding themselves too much confined in their habitation, they frequently leave their natal locality. Particular signs intimate to the owner the loss with which he is menaced; he endeavours to prevent it, or to profit by the emigration.

Dreadful combats sometimes take place among Bees. At a particular epoch in which the males become useless, the females having been fecundated—from the month of June to that of July—the labourers put them to death, extending the carnage even to the larvæ and nymphs of that sex.

Bees have enemies both external and internal, and are subject to various diseases.

The intelligent apiarist bestows particular attention on these animals, carefully selects, among the different kinds of hives that have been invented, that which is the least expensive in its construction, and the best adapted to preserve and rear them; he studies their habits, foresees the accidents with which they are threatened, and never has occasion to regret his labour and trouble. The origin of the attention bestowed upon Bees is lost in the remotest antiquity. With the ancient Egyptians the Bee was the hieroglyphic emblem of royalty.

The true Bees are only found in the eastern continent; and those of southern and eastern Europe, and of Egypt, differ from those that inhabit France, which have been transported to America and other places where they are now naturalized.

The species found in the Isle of France and in Madagascar —*A. unicolor*, Lat.—produces honey called *vert* or green, that is held in great estimation(1).

The last subgenus of the social Apiariæ, or

MELIPONA, Illig. Lat.—*Trigona*, Jur.

Is distinguished from the preceding one by the form of the first joint of the posterior tarsi, which is narrowed at base, or has the figure of a reversed triangle, and is destitute of striæ on the silken brush of its inner side. There are but two complete cubital cells in the superior wings, while in the Bees there are three, the last linear and oblique(2).

These Hymenoptera are found in South America. They construct their nests on the tops of trees, or in their hollows.

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(1) For the other species, see Lat., in the Obs. Zool. et Anal. of Messrs Humboldt and Bonpland.

(2) Those species, in which the mandibles are not dentated, are the MELIPONÆ properly so called. Those, in which they are, form the genus TRIGONA. See my Gener. Crust. et Insect., IV, 182.

That of the *M. amalthée* is shaped like a bagpipe. The honey it produces is sweet, and very agreeable to the palate, but extremely liquid, and is soon decomposed. The Indians extract a spirit from it of which they are extravagantly fond.

M. Cordier, of the Ac. Roy. des Sc., and professor of geology to the Jardin du Roi, has in his possession a fragment of amber containing an individual of this species. It appears that other Meliponæ —*Trigonæ*, Lat.—are found in the island of Sumatra.

ORDER X.

LEPIDOPTERA(1).

The tenth order of Insects terminates the series of those which are furnished with four wings, and presents characters exclusively peculiar to it.

Both sides of the wings are covered with small, coloured scales, resembling farinaceous dust, that are removed by merely coming in contact with the finger. A proboscis, to which the name of *lingua*(2) or tongue has been affixed, rolled spirally between two palpi, covered with scales or hairs, forms the most important part of the mouth, and is the instrument with which these Insects extract the nectar from flowers, their only aliment. In our general observations upon the class of Insects, we have seen, that this proboscis or trunk is composed of two tubular threads, representing the maxillæ, each bearing, near its external base, a very small (*superior*) palpus in the form of a tubercle. The apparent (*inferior*) palpi, those which form a sort of sheath to the proboscis, replace the labial palpi of the triturating Insects; they are cylindrical or conical, usually turned up, composed of three joints, and inserted in a fixed labium, which forms the paries of the portion of the buccal cavity, inferior to the proboscis. Two little and scarcely distinct, corneous, and more or less ciliated pieces, situated, one on each side, on the anterior and superior margin of the front of the head, near the eyes, seem to be vestiges of mandibles. Finally, we observe, and in equally exiguous proportions, the labrum or upper lip.

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(1) The *Glossata*, Fab.

(2) The *spiritrompe*, according to the nomenclature of Latreille.

The antennæ vary and are always multiarticulated. Two ocelli are observable in several species, but concealed between the scales(1). The three segments of which the trunk of the hexapoda is composed, are united in one single body; the first is very short, and the two others are confounded together. The scutellum is triangular, but the apex is directed towards the head. The wings are simply veined, and vary in size, figure and position; in several, the inferior ones are plaited longitudinally near their inner margin. At the base of each of the superior wings is a kind of epaulette, prolonged posteriorly, that corresponds to the piece called *tegula* in the Hymenoptera. As it is more developed here, I will call it *pterygoda*. The abdomen, composed of from six to seven annuli, is attached to the thorax by a very small portion of its diameter, and presents neither sting nor ovipositor analogous to that of the Hymenoptera. In several females, however, as in *Cossus*, the last rings become narrowed, and extended to form an oviduct resembling a pointed and retractile tail. The tarsi always have five joints. There are never more than two kinds of individuals, males and females. The abdomen of the former is terminated by a kind of flat forceps which contains the penis.

The females usually deposit their ova, frequently very numerous, on the vegetable surfaces which are to nourish their larvæ, and soon after perish.

The larvæ of Lepidopterous Insects are well known by the name of *caterpillars*. They have six squamous or hooked

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(1) According to an observation made by Dalman, they do not exist in the Diurnæ.

feet, which correspond to the legs of the perfect Insect, and from four to ten additional membranous ones, the two last of which are situated at the posterior extremity of the body, near the anus; those which have but ten or twelve in all, have been called, from their mode of progression, *geometræ.* They cling to the plane of position with their squamous feet, and then elevating the intermediate segments of the body in the form of a ring or buckle, approximate the two hind feet to the preceding ones, disengage the latter, hold on with the last feet, and move their body forwards to recommence the same operation. Several of these geometræ, when at rest, remain fixed to the branches of plants by the hind feet alone, where, in the form, colour and direction of their body they resemble a twig; they can support themselves in this position for a long time, without exhibiting the slightest symptom of life. So fatiguing an attitude must require prodigious muscular force, and in fact Lyonet counted *four thousand and forty-one muscles* in the caterpillar of the *Cossus ligniperda.* Some caterpillars with fourteen or sixteen feet, but of which some of the intermediate membranous ones are shorter than the others, have been called *pseudo-geometræ.* The membranous feet are frequently terminated by a more or less complete crown of little hooks.

The body of these larvæ are generally elongated, almost cylindrical, soft, variously coloured, sometimes naked, and sometimes covered with hairs, tubercles and spines. It is composed of twelve segments or annuli, exclusive of the head, with nine stigmata on each side. Their head is invested with a corneous or squamous dermis, and presents on each side six shining granules, which appear to be ocelli; it is also furnished with two very short and conical antennæ, and a mouth composed of strong mandibles, two maxillæ, a labium and four small palpi. The silk they employ is elaborated in two long and tortuous internal vessels, of which the attenuated superior extremities terminate in the lip. A tubular and conical mammilla is the spindle through which the threads are spun.

Most caterpillars feed on the leaves of plants; some gnaw their flowers, roots, buds and seeds; others attack the ligneous or hardest part of trees, softening it by means of a fluid which they disgorge. Certain species attack our woollens and furs, thereby doing us much injury: even our leather, bacon, wax and lard are not spared by them. Several confine themselves exclusively to a single article of diet; others are less delicate, and devour all sorts of matters(1).

Some of them form societies, and frequently live under a silken tent, spun by them in common, which even shelters them during the winter. Several construct sheaths for themselves, either fixed or portable. Others make their abode in the parenchyma of leaves, where they form galleries. The greater number are diurnal. The others never issue forth but at night. The severity of winter, so fatal to almost all Insects, does not affect certain Phalænæ, which only appear in that season.

Caterpillars usually change their skin four times, previously to passing into the state of a nymph or chrysalis. Most of them spin a cocoon in which they enclose themselves. A frequently reddish liquor or sort of meconium, which Lepidopterous Insects eject per anum, at the moment of their metamorphosis, softens or weakens the extremity of the cocoon, and facilitates their exit; one of these extremities also is generally thinner than the other, or presents a favourable issue by the peculiar disposition of the fibres. Other caterpillars are contented with connecting leaves, particles of earth, or of the substances on which they have lived, and thus forming a rude cocoon. The chrysalides of the Diurnal Lepidoptera, ornamented with golden spots, whence the term chrysalis, are naked and fixed by the posterior extremity of the body. The nymphs of the Lepidoptera present a special character, of which we have spoken in our general observations on the class of Insects. They are *swathed* or resemble *mummies*(1). Those of several Insects of this order, particularly of the Diurnæ, undergo their metamorphosis in a few days; they even frequently produce two generations in the course of the year. The caterpillars or chrysalides of others, however, remain during the winter in one of those states, and only appear as perfect Insects in the spring or summer of the following year. Generally speaking, the eggs laid in the fall are not hatched till the ensuing spring. The Lepidoptera issue from their envelope in the usual manner, or through a slit which is effected on the back of the thorax.

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(1) One of the most evident proofs of the divine providence is the perfect coincidence of the appearance of the caterpillar with that of the plant on which it is to feed.

The intestine of caterpillars consists of a large tube without flexures, of which the anterior portion is sometimes slightly separated in the manner of a stomach, and the posterior forms a wrinkled cloaca; their four biliary vessels are very long and inserted very far back.

In the perfect Insect, we find a first lateral stomach or crop, a second inflated or turgid stomach, and a tolerably long small intestine, with a cæcum near the cloaca(2).

The larvæ of the Ichneumonides and Chalcidites deliver us from a great portion of these destructive animals.

We will divide this order into three families, which correspond to the three genera of which it is composed in the system of Linnæus.

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(1) The sheaths of the legs and antennæ are fixed, a character peculiar to this sort of metamorphosis.

(2) For the anatomy of the caterpillar, see the admirable work of Lyonet; and for the development of the organs in the chrysalis and butterfly, that of Herold, entitled *History of the development of Butterflies*, in German, Cassel and Marburg, 1815.

FAMILY I.

DIURNA.

This family(1) is the only one in which the exterior margin of the inferior wings does not present a rigid, squamous seta or kind of bridle for retaining the two superior ones. These latter, and even most frequently the former, are raised perpendicularly when the Insect is at rest. The antennæ are sometimes terminated by a globuliform inflation or little club, and are sometimes almost of equal thickness throughout or even more slender, and form a hooked point at the extremity.

This family comprises the genus

Papilio, Lin.

The larvæ always have sixteen feet. The Chrysalides are almost always naked, are attached by the tail, and most commonly angular. The perfect Insect, always provided with a proboscis or trunk, flies during the day only, and the colours which ornament the under part of the wings do not yield in beauty to those which decorate their superior surface.

We will divide these Insects into two sections.

Those of the first have but a single pair of spurs or spines to their tibiæ, which are found on their posterior extremity. Their four wings are raised perpendicularly when at rest. Their antennæ are sometimes inflated at the extremity, globuliform, or in a little club truncated and rounded at the summit, and sometimes almost filiform.

This section includes the genus Papilio and the Hesperiæ *ruricolæ* of the system of Fabricius.

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(1) Some of the Nocturna excepted.

For the genera of the Diurnal Lepidoptera, see the first numbers of the Descriptive Catalogue of the Lepidoptera in the Museum of the East India Company, of M. Horsfield.

We may divide this section, extremely rich in species, in the following manner.

1. Those in which the third joint of the inferior palpi is sometimes almost wanting, and sometimes very distinct, but as well furnished with scales as the preceding one, and in which the hooks of the tarsi are very apparent or salient.

Their caterpillars are elongated and almost cylindrical. Their chrysalides are almost always angular, sometimes smooth, but enclosed in a rude cocoon.

Of these, there are some—the *Hexapoda*—in which all the feet are adapted for walking, and are almost identical in both sexes(1). Their chrysalis, in addition to the ordinary posterior attachment, is fixed by a silken thread over its body. That of some is enclosed in a rude cocoon. The central cell of the lower wing is closed inferiorly(2).

Here the internal margin of these wings is concave or plaited.

PAPILIO proper.—*P. Equites*, Lin.

Where the inferior palpi are very short, scarcely reaching the clypeus with their superior extremity, and their third joint is indistinct.

The caterpillars, when alarmed, protrude from the superior part of their neck a soft, forked horn, that usually diffuses a penetrating and disagreeable odour. Their skin is naked. The chrysalis is attached with a silken band and exposed.

The species of this subgenus are remarkable for their size and varied colouring. They are more particularly abundant in the tropical countries of both hemispheres. Those with red spots on the breast form the division of the *Equites Troes* or *Trojan Knights* of Linnæus. Those which are destitute of those marks in that place he styles *Achivi* or *Greeks*. The inferior wings of several are prolonged into a sort of tail. Such is the

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(1) The Papilios properly so called, or those belonging to the Linnæan division of the *Equites*, are connected by one extremity of the series with the mottled Danaides, and by the other with the Parnassii. From the latter we pass to Thais and thence to Pieris. The preceding Danaides connect themselves with the Heliconii. From this it follows that we should begin the series of the diurnal Lepidoptera with the Tetrapoda, such as Satyrus, Pavonia, Morpho and Nymphalis, in order to reach the Heliconii through Argynnis and Cethosia. The Diurnæ would be divided into two great sections; those whose chrysalids are suspended vertically, and simply attached by the extremity of their tail, and those where they are not only fixed by that extremity, but also by a silken band surrounding the body like a sling. The first are always tetrapodous. We would begin with those of which the caterpillars are naked or nearly so, and generally bifid at the posterior extremity; then would come those where they are spinous.

(2) I employed this character in my Gener. Crust. et Insect.; Dalman and Godart have generalized its application in relation to this family.

P. machaon, Lin.; *P. grand-porte-queue*, Godart, Hist. Nat. des Lépid. de France, I, 1, 2. Wings yellow, spotted and striped with black; inferior wings prolonged into a tail and with blue spots near the posterior margin, one of them ocelliform; some red on the internal angle. France.

The caterpillar is green with black rings dotted with red. It feeds on the leaves of the carrot, fennel, &c.

Two other tailed Papilios are found in France, the *P. podalirius*, Godart, Ibid., I, 1, 2; and the *P. Alexanor*(1).

ZELIMA, Fab.

This subgenus only differs from Papilio proper in the club of the antennæ which is shorter and more rounded.

I know two species, one from Senegal, the other from Guinea, both of which are in the splendid collection of Count Dejean.

PARNASSIUS, Lat.—*Doritis*, Fab.

Where the inferior palpi evidently extend above the clypeus, taper to a point and are distinctly triarticulated. The terminal button of their antennæ is short, almost ovoid and straight. The females have a kind of corneous boat-shaped sac at the posterior extremity of their abdomen.

The caterpillars also have a retractile tentaculum in the neck like those of the true Papilio, but the cocoon in which they become chrysalides is formed of leaves connected by filaments of silk.

The species are exclusively proper to the Alpine and subalpine regions of Europe and the north of Asia. Such for instance is the

P. Apollo; *Papilio Apollo*, L.; Godart, Hist. Nat. des Lépid. de France, II, B, ii, 1. White, spotted with black; four ocellated spots, bordered with a red circle and a black one, on the inferior wings.

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(1) For the remaining species, see Godart, Ibid., and the Encyc. Méthod., article *Papillon*, genus *Papillon*. See also, for European species, the excellent work of Ochsenheimer, continued by M. Treitschke.

For the species of this genus and of those Lepidoptera in general that inhabit this country, see the work of Messrs Bois-Duval and Major Le Conte on the Lepidoptera of the United States, now being published in Paris. *Am. Ed.*

The caterpillar lives on the *Sedum telephium*, on the *Saxifraga*, &c. It is of a velvet-black with a series of red dots on each side, and another on the back. The chrysalis is rounded, of a blackish green sprinkled with white or bluish(1).

Thais, Fab.

The palpi of the Parnassii, but the terminal button of the antennæ elongated and curved; no corneous pouch at the posterior extremity of the abdomen of the female.

The caterpillars, as it appears, have no retractile tentaculum.

The species are peculiar to the south of Europe, and some of them to the mountains(2).

There, the inferior wings project under the abdomen, forming a groove for it.

The caterpillars have no tentaculum. Several live on the Crucigeræ.

These Lepidoptera—*P. Danai candidi*, L.—form two subgenera.

Pieris, Schr.—*Pontia*, Fab.

Where the inferior palpi are almost cylindrical, and slightly compressed, with the last at least almost as long as the preceding; the club of the antennæ is ovoid(3).

Colias, Fab.

Where that club forms an elongated and reversed cone, and the inferior palpi are strongly compressed, with the last joint much shorter than the preceding one(4).

In the other Papilios of the same division—*Tetrapoda*—the two anterior legs are much shorter than the others, folded, non-ambulatory in both sexes, and sometimes in the males only. The chrysalis is simply suspended vertically by the posterior extremity.

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(1) See Godart, Ibid., and Encyc. Méthod., article *Papillon*, genus *Parnassien*.

(2) The *P. hysipyle, rumina*, Fab. See also the works before quoted.

(3) Here come the Lepidoptera, designated by the general name of Brassicariæ, such as the *P. brassicæ*, L., *P. rapæ*, L., *P. napi*, L., *P. daplidice*, L., *P. sinapis*, L., *P. cardumines*, L., &c. nearly all of which appear early in the spring.

(4) *P. Hyale*, L.;—*P. rhamni*, L.;—*P. Cleopatra*, &c. See the works already quoted.

Sometimes the anterior legs, though folded and smaller than the others, differ from them but little. The inferior wings, of which the central cell is always closed posteriorly, but slightly clasp the abdomen in most of them. The inferior palpi are distant, slender, cylindrical, and generally very short. All the subgenera of this subdivision are foreign to Europe.

We distinguish the Danaides—DANAIS; *Euploea*, Fab.; part of the *P. danai festivi*, L.—by their triangular wings and their antennæ terminated by a kind of elongated and curved button(1); the Ideæ—IDEA, Fab.—by their almost oval and elongated wings, and nearly filiform antennæ(2). In these two subgenera the inferior palpi hardly reach above the clypeus, and their second joint is scarcely twice as long as the first.

In the two following subgenera where the wings resemble those of the preceding subgenus, but are usually narrower and more elongated, and where the abdomen is also proportionally longer than that of most of the preceding ones, that joint is much longer than the first and its extremity evidently extends beyond the clypeus. In the Heliconii—HELICONIUS, Lat.; *Mechanitis*, Fab.; *P. peliconii*, Lin.—the antennæ are twice the length of the head and thorax, and insensibly enlarged towards the extremity(3). Those of the Acreæ—ACRÆA, Fab.—are shortly and abruptly globuliform(4).

Sometimes—*P. nymphalis*, L.—the two anterior legs are strongly folded, either apparent and very hairy, or small and concealed. The inferior wings, of which the central cell is open in several, evidently embrace the abdomen beneath. The inferior palpi are proportionally longer and frequently thicker and more approximated.

Here, the central cell of the inferior wings is open.

Those in which the inferior palpi are but slightly compressed, distant throughout their length, or at least at their extremity, and abruptly terminated by a slender and acicular joint; where the under surface of the wings frequently presents silvery or yellow spots on a fulvous ground; and the caterpillars of which are always covered with spines or fleshy and hairy tubercles, compose the subgenera CETHOSIA, Fab., and ARGYNNIS, MELITŒA, Fab. In the first, several species of which have elevated and elongated wings, the inferior palpi are distant throughout their whole length, the hooks of the tarsi are simple, and the club of the antennæ is oblong(1). In the second it is short and abrupt; the hooks of the tarsi are unidentated, and the inferior palpi are only distant at their extremity. The inferior wings are frequently round.

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(1) Lat., Gener. Crust. et Insect., IV, 201; Encyc. Méthod., Insect. IX, article *Papilion*, genus *Danaïde*.

(2) Lat., Ibid., Idem; Encyc. Méthod., Ibid., genus *Idea*.

(3) Lat., Gener. Crust. et Insect., IV, 201; Encyc. Méthod., article *Papilion*, genus *Héliconie*.

(4) Lat., Ibid., Idem.; Encyc. Méthod., Ibid., genus *Acrée*.

Some—*Argynnis*, Fab.—have nacred spots on the under part of their wings. Their caterpillars are furnished with spines, two on the neck longer than the rest. Those of the others—*Melitœa*, Fab.—have little hairy tubercles; the wings are spotted like a chess-board, and the nacre is replaced by yellow, a circumstance which sometimes occurs in the preceding ones(2).

Those in which the inferior palpi are contiguous throughout their whole length, terminated almost insensibly in a point, and strongly compressed, form five other subgenera.

VANESSA, Fab.

The Vanessæ are removed from the following ones by their antennæ, abruptly terminated by a short turbinated or ovoid button. Their caterpillars are densely spinous.

V. morio; Papilio Antiopa, L.; Godart, Hist. Nat. des Lépid. de France, I, 5, 1. Wings angular, of a deep purple-black, with a yellowish or whitish band on the posterior margin, and a suite of blue spots above.

Its caterpillar is blackish, spinous, and has a range of red, square, divided spots along the back. It feeds on the leaves of the Birch, Poplar and Willow, where it lives in society. It appears at two periods.

V. Io; Papilio Io, L.; Godart, Ibid., I, 5, 2. Wings angular and dentated, reddish-fulvous above with a large ocellated spot on each; that of the superior wings reddish in the centre and surrounded with a yellowish circle; the one on the inferior blackish, surrounded by a grey circle, and enclosing bluish spots; under surface of the wings blackish.

Its caterpillar is black, dotted with white, and covered with hairy spines. On the Nettle.

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(1) See the works already quoted.

(2) Idem.

V. cardui, *Papilio cardui*, L.; Godart, Ibid., I, 5, sect. 2. Wings dentated; above red and varied with black and white; beneath marbled with grey, yellow and brown; five ocellated and bluish spots on their margin.

The caterpillar lives solitary on the Thistle. It is sometimes brownish with yellow stripes, and sometimes russet with transverse yellow bands. It is spinous. The perfect Insect only appears towards the close of summer.

V. Atalanta; *Papilio Atalanta*, L.; *V. Vulcain*, Godart, Ibid., I, 6, 1. Wings dentated, somewhat angular; above black, traversed by a beautiful red band, and with white spots on the superior ones; marbled with various colours beneath.

The caterpillar is black, spinous, and has a suite of lemon-coloured lines on each side. It lives on the Nettle, prefers the seeds, and remains hidden on the top of the plant among the leaves, which it rolls up and secures with silk.

The same division includes various other species very common in France, such as the *V. polychloros* (*Papilio polychloros*, L.), the *V. urticæ* (*P. urticæ*, L.), the *V. c. album* (*P. c. album*, L.). The chrysalis of the latter bears a rude resemblance to a human face or the mask of a Satyr(1).

In the four following subgenera the antennæ terminate in an elongated club, or are almost filiform.

The caterpillars are naked or present but few spines.

LIBYTHEA, Fab.

Where the males only have the two anterior legs very short and resembling a sort of tippet. The inferior palpi project considerably in the manner of a rostrum. The superior wings are very angular(2).

BIBLIS.—*Melanitis*, Fab.

Where those palpi are also longer than the head, but more obtuse and slightly curved at their extremity; where the two anterior legs are short and folded in both sexes, and the antennæ terminate in a much smaller club. The wings are also proportionally wider and simply dentated. It has been observed that the nerves of the superior ones are strongly inflated at their origin(1).

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(1) For the other species, see Godart, Ibid., and the Encyc. Méthod., article *Papillon*, genus *Vanesse*.

(2) See the works already quoted.

NYMPHALIS, Lat.

Similar to Biblis in the legs, but with shorter inferior palpi. It is only by the elongation of the club of the antennæ that this subgenus is distinguished from Vanessa. The caterpillars, however, are different; independently of their having but few spines or fleshy prominences, they are somewhat attenuated towards their posterior extremity, which is slightly forked.

These Lepidoptera are usually very highly ornamented, and their flight is elevated and rapid.

Several beautiful species inhabit France. Such are those designated in small groups by amateurs, by the names of *Sylvains* and *Mars;* the males of the latter are decorated with changeable colours. To this subgenus belongs another beautiful species, also indigenous to France, called the Jason—*Papilio Jason*, L. The form and size of the club of the antennæ vary a little, as well as the relative proportions of the wings; this has caused the formation of some other subgenera, but their characters are very equivocal. The species which approximate most to Biblis, one of which is the *Sylvain cænobite* of Engrammelle, form the genus *Neptis* of Fabricius. Of those which are most removed from the preceding ones either by their antennæ or the inferior wings, and which present tails like certain species of the *Equites* of Linnæus, we will mention the *Jason* already quoted(2).

MORPHO, Fab.

Differing from Nymphalis in the almost filiform antennæ, slightly and gradually enlarged towards the extremity.

All the species are peculiar to South America, and are remarkable for their size, colours, and the ocellated spots on the inferior surface of their wings. Linnæus placed several of them among his Greeks(3).

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(1) See the same works.

(2) See Godart, Hist. Nat. des Lépid. de France, and his article *Papilion* of the Encyc. Méthod., genus *Nymphale*.

(3) See the works already quoted.

Godart has separated from them, by the generic name of

PAVONIA,

Those species in which the central cell of the inferior wings is closed, and where the most internal nerve of the superior is curved into an S instead of being straight or but slightly arcuated. A species peculiar to the East Indies, in which the anal angle of the inferior wings is extended in the manner of a tail, the *P. phidippus*, is the type of the genus AMATHUSIA of Fabricius. All the others are from the western continent. The edge of the second joint of the inferior Palpi in Pavonia, Morpho, and the other preceding subgenera is tolerably wide; these palpi are not strongly compressed, as is the case in Satyrus, a subgenus very analogous to the two preceding ones.

In the following subgenera the discoidal cell of the inferior wings is also closed posteriorly.

BRASSOLIS, Fab.

Where the antennæ are abruptly terminated by a thickened, obconical club, and the inferior palpi are short and do not extend beyond the clypeus. Near the inner margin of the inferior wings of the males is a longitudinal fissure covered with hairs(1).

EUMENIA, Godart.

Where the inferior palpi are longer, and where the antennæ, at a short distance from their origin, become gradually thicker, and form an extremely elongated club(2). The

EURYBIA, Illig.

Approaches Brassolis in the shortness of the inferior palpi; but they are proportionally thicker, and the club of the antennæ is fusiform, elongated, and slightly curved(3).

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(1) See Encyc. Méthod., article *Papillon*, genus *Brassolide.*

(2) Encyc. Méthod., Insect., IX, 826. The only specimens in the possession of Godart, had lost their antennæ. M. Poë has sent me some that are perfectly entire, captured by him in Havana.

(3) See Encyc. Méthod., same article.

SATYRUS, Lat.

Where the inferior palpi, as usual, extend beyond the clypeus, are strongly compressed, and have a sharp, densely pilose edge; where the antennæ are terminated by a little globuliform inflation, or an elongated and slender club. Godart has remarked that the two or three first nervures of the superior wings are strongly inflated at their origin.

The caterpillars are naked, or nearly so, and the posterior extremity of their body is narrowed into a forked point. The chrysalides are bifid anteriorly, and present dorsal tubercles(1).

We will terminate this first section of the Diurnal Lepidoptera with those in which the inferior palpi have three distinct joints, but the last almost naked, or much less thickly covered with scales than the preceding ones, and where the hooks of the tarsi are very small, and not at all, or scarcely, salient. The discoidal cell of the inferior wings is open posteriorly.

Their caterpillars are oval, or have the form of Onisci. The chrysalides are short, contracted, smooth, and always fixed by a silken band that traverses the body, like those of Papilio proper, the Pierides, &c.(2)

Linnæus placed them among his *Plebei*, in the division of the *Ruricolæ*, and Fabricius—Entom. Syst.—in a homonymous section of his *Hesperiæ*. They form the genus *Argus* of M. de Lamarck. Fabricius ultimately—Syst. Gloss.—divided it into several genera, the characters of which demand revision.

Sometimes the antennæ terminate, as usual, in a solid, globuliform, or clavate inflation.

In some, or at least their males, the two anterior legs are much shorter than the others. They compose the subgenus

ERYCINA, Lat.,

And are peculiar to America(3).

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(1) See Hist. Nat. des Lépid. de Fr., and Encyc. Méthod., same article, genus *Satyre*.

(2) According to this view of the subject, these subgenera ought to terminate this section, which should begin with Satyrus. Such was the arrangement we originally adopted.

(3) Encyc. Méthod., article *Papillon*, genus *Erycine*.

In the others all the legs are alike in both sexes.

MYRINA, Fab.

The Myrinæ are distinguished from the following subgenera by the remarkable elongation and projection of their inferior palpi(1).

Those species in which these organs do not extend considerably beyond the clypeus form the subgenus

POLYOMMATUS,

So called because the wings of most of them are marked with small ocellated spots.

Several species have been collectively designated by the name of *Petits porte-queue*. The most common in the environs of Paris is the

> *P. Alexis; Papilio Alexis*, Hübn., LX, 292—294; *Argus bleu*, Geoff.; Godart, Hist. Nat. des Lépid., &c., I, ii, sect. 3. Superior surface of the wings of the male azure blue, changing to a delicate violet, with a small black streak along the posterior margin, and a very white fringe; that of the female, brown, with a range of fulvous spots near the posterior margin, and a black line on the middle of the superior ones. The inferior surface of the wings is nearly the same in the two sexes; it is grey, with a range of fulvous spots enclosed between two lines of black points and streaks near the posterior margin; we may also observe some black points margined with white.
>
> Its caterpillar lives on the Onobrychys, Broom, &c. Its colours are various(2).

Other Lepidoptera of the same division present antennæ of a truly insulated form. Those of one of the sexes of the BARBICORNIS, Godart, are setaceous and plumous(1). Those of the Zephyrius, Dalm., are terminated by ten or twelve globular joints separated like the beads of a rosary(2).

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(1) Ibid. Fabricius has established several other genera in this division, which I have not yet sufficiently examined. Certain species from South America resemble Pyrales in their superior wings, which are arcuated exteriorly at base. The club of the antennæ also presents various modifications which may serve as a ground of division; but we should have a great number of species, and be particularly well acquainted with their metamorphoses.

(2) For the other species indigenous to France, see Lat., Nouv. Dict. d'Hist. Nat., XVII, p. 79, *Pap. plébéiens;* Godart, Hist. Nat. des Lépid. de France, his Tableau Méthodique, accompanying that work; and Encyc. Méthod., article *Papillon.*

2. The second section of the Diurnal Lepidoptera is composed of species in which the posterior tibiæ have two pairs of spines, one at their extremity, and the other above; such also is the case in the two following families. The inferior wings are usually horizontal when at rest, and the extremity of their antennæ very often forms a strongly hooked point.

Their caterpillars, of which however but few are yet known, bend leaves together, and spin an extremely thin cocoon of silk (in the cavity), in which they become chrysalides; the latter are smooth or without angular elevations.

These Lepidoptera form the Plebei, Urbicolæ of Linnæus, or the *Papillons estropiés* of Geoffroy. Fabricius united them to *Argus* by the generic name of Hesperia, but we must also refer to this section certain exotic Lepidoptera, called *pages* by the amateurs, of which the original habitat had not hitherto been well ascertained: such are the *Uraniæ* of Fabricius. These various Lepidoptera lead to our second family.

They compose two subgenera:

Hesperia, Fab.

Or the *P. plebei urbicolæ* of Linnæus in which the termination of the antennæ is distinctly globuliform or clavate, and the inferior palpi are short, broad, and densely covered with scales anteriorly.

> *H. malvæ*, Fab.; Rœs., Insect. CL, 2, x. Wings dentated, blackish-brown above, spotted and speckled with white, the posterior margin marked with spots of the latter colour; inferior surface of the wings greenish-grey with irregular and similar spots.
>
> The caterpillar is elongated, grey, with a black head, and four yellow points on the neck or first ring which is narrowed, a character peculiar to the larvæ of this subgenus. It lives on the Malvaceæ, bends their leaves together and there undergoes its metamorphosis. The chrysalis is black but sprinkled with bluish(3).

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(1) Encyc. Méthod., Insect., IX, p. 705, a genus perhaps established on false antennæ.

(2) Dalm., Anal. Entom., 102.

(3) For the other species, see Fab., Entom. Syst., division of the *Urbicolæ;*

Urania, Fab.

Where the antennæ, at first filiform, become attenuated or setaceous at the extremity, and where the inferior palpi are elongated and slender, with the second joint strongly compressed, and the last much smaller, almost cylindrical and naked(1).

FAMILY II.

CREPUSCULARIA.

In this family, near the origin of the external margin of their inferior wings, we observe a rigid squamous seta, in the form of a spine or bristle, which passes into a hook on the under surface of the superior wings, maintaining them, when at rest, in a horizontal or inclined position(2). This character is also visible in the ensuing family, but the Crepuscularia are distinguished from the latter by their antennæ, which form an elongated club, either prismatic or fusiform.

The caterpillars have always sixteen feet. The chrysalides are destitute of the points or angles observed in most of those of the Diurnal Lepidoptera, and are usually enclosed in a cocoon or concealed, either in the earth, or under some body. These Lepidoptera frequently appear only in the morning or evening.

They compose the genus

Sphinx, Lin.—*Papillons-Bourdons*, De Geer,

So named from the attitude of several of the caterpillars, which resembles that of the fabled monster so called. They have received

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Encyc. Méthod., article *Papillon*, genus *Hespérie*; and the Hist. Nat. des Lépid. de France of Godart.

(1) The *Pap. riphæus*, *leilus*, *Lavinia*, *Orontes*, Fab.; *Noctua Patroclus*, ejusd. The Uraniæ compose the genera *Cydimon*, *Nyctalamon* and *Sematura* of Dalman. See his Prodromus of the Monograph of the genus Castnia, p. 26.

(2) In certain Smerinthi, however, according to Godart, they are wanting.

that of *Papillons-Bourdons* from the humming noise they frequently produce while on the wing.

I will divide this subgenus into four sections, corresponding in a similar order to the genera *Castnia* and *Sphinx* of Fabricius, and to those which he first called *Sesia* and *Zygæna*.

The first, or that of the HESPERI-SPHINGES(1), consists of Lepidoptera, which evidently connect the Hesperiæ with Sphinx proper. The antennæ are always simple, thickened in the middle or at the extremity which forms a hook, narrowed into a point at the end, and without a tuft of scales. They all have a very distinct proboscis; the inferior palpi are composed of three very apparent joints. In some, the second is elongated and strongly compressed, the third slender, almost cylindrical and nearly naked; these palpi resemble those of the Uraniæ; in others, they are shorter but wider, almost cylindrical, and well furnished with scales. The antennæ of the latter are only inflated at the extremity.

Those, in which the inferior palpi are elongated, with the second joint strongly compressed, and the last slender and almost naked, in which the antennæ are simple, gradually thickened near the middle, and then become narrowed and terminate in an elongated hook, form the subgenus

AGARISTA, Leach(2).

Those, in which the inferior palpi are similarly formed, but where the antennæ are terminated abruptly in a club with a short terminal hook, compose the subgenus

CORONIS, Lat.(3)

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(1) In this section, at least for the present, I will arrange the genus HECATESIA, established by M. Bois-Duval, in his lately published interesting Monograph, with which he terminates the first part of another work, that will be highly useful to amateurs, entitled *Europæorum Lepidopterorum Index Methodicus*. He thus characterizes the above genus: antennæ rough and fusiform, as in Nymphalis, the joints distinct to the club; palpi densely pilose, with indistinct joints, and not extending beyond the clypeus; proboscis corneous and rolled up spirally; thorax very hairy; wings laid on the body. The only species known, the *H. fenestrata*, is found in New Holland.

(2) See Encyc. Mèthod., article *Papillon*, genus *Agariste*. Near this genus comes that of *Cocytia* of M. Bois-Duval; the wings are marked with square transparent spots, a character which seems to approximate them to Sesia; but the palpi are those of Urania, and the antennæ are as in Agarista.

(3) Founded on a species from Brazil, now in the cabinet of Count Dejean, and which I believe is undescribed.

Finally, those in which the antennæ are similar to those of the Agaristæ, but where the palpi are shorter, wide, and cylindrical, form the

Castnia, Fab.

All the species belong to the eastern continent(1).

Those of our second section, or the Sphingides, always have the antennæ terminated by a little flake of scales; the inferior palpi broad, or compressed transversely, densely covered with scales, and the third joint usually indistinct.

Most of the caterpillars have an elongated, smooth body, thickest at the posterior extremity, which is furnished with a horn, and its sides striped obliquely or longitudinally. They live on leaves, and are metamorphosed in the earth without spinning a cocoon.

Sphinx proper.

Where the antennæ, commencing from the middle, form a prismatic club, simply ciliated, or transversely striated on one side in the manner of a rasp. They have a very distinct proboscis and fly with great velocity, hovering over flowers with a humming noise. In the chrysalides of some species the sheath of the proboscis projects in the manner of a snout(2).

S. euphorbiæ, L.; Rœs., Insect., I, cl., 1, Pap. Noct., III. Superior surface of the upper wings reddish-grey, with three green spots and a broad band of the same colour; that of the lower wings red, with a black band and a white spot. Antennæ white. The body olive-green above; abdomen conical, sharply pointed, and without a terminal brush.

The caterpillar is black, with yellow spots and points; a line along the back, tail and feet red.

S. Atropos; L.; Rœs., Insect. III, 1. Superior wings variegated with deep and yellowish-brown, and light-yellowish; inferior wings yellow, with two brown bands; a yellowish spot with two black dots on the thorax; abdomen yellowish, with black annuli, and without a terminal brush. This is the largest species in France. The spot on the thorax resembling a death's head, and the sharp sound it produces (attributed by Reaumur to its rubbing the palpi against its proboscis(1), and by M. Lorey to the rapid escape of air from two particular cavities of the venter), have frequently produced considerable alarm among the people in certain years when it was unusually abundant(2).

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(1) See Encyc. Méthod., Ibid., and the already quoted Monograph of Dalman.

(2) Curving downwards, and the extremity laid on the pectus resembling the handle of a vase. *Am. Ed.*

The caterpillar is yellow, with blue stripes on the side, and the tail recurved and zig-zag. It feeds on the Potato-vine, Jasmin, &c., and becomes a chrysalis near the end of August. The perfect Insect appears in September.

The caterpillars of certain species, all remarkable for their beautiful colours—the *celerio*, *nerii*, *Elpenor*, *porcellus*—have the anterior extremity of the body strongly attenuated in the manner of a Hog's snout, whence their French name of *Cochonnes*, and susceptible of being retracted within the third ring. The sides are marked with some ocellated spots. These species, in this respect, form a very natural division.

In others, as in the Sesiæ, the abdomen is terminated by a brush of scales. Scopoli formed a separate genus with them, his MACROGLOSSUM; and Fabricius at first united them with his Sesiæ. He afterwards—System. Glossat.—separated them, leaving that generic appellation to this group, and giving the name of ÆGERIA to the primitive Sesiæ. But the Lepidoptera, he now calls SESIÆ, have the essential characters of Sphinx; such is the *stellatarum*, L.; and those he calls *fuciformis*, *bombyliformis*, &c. The wings of the two latter are mostly diaphanous(3).

SMERINTHUS, Lat.

Where the antennæ are serrated and there is no distinct tongue.

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(1) It is proportionally shorter than in the other Sphinges. It is probably from this character that the Atropos and another very analogous species from Java have been made to form the genus *Acherontia*.

(2) According to M. Passerini—Ann. des Sc. Nat., XIII, 332—the organ that produces this noise is seated in the head.

(3) For the other species, see Fabricius, loc. cit.; Godart's Hist. Nat. des Lépid. de France; and a Memoir of Bois-Duval, in the Mem. de la Soc. Lin. de Paris. M. Lefébure de Cerisy, naval engineer, has prepared a most excellent Monograph of this genus, accompanied with good figures, which circumstances have not yet allowed him to publish. [For American species, see the work already quoted, on the Lepidoptera of the United States, by Bois-Duval and Le Conte. *Am. Ed.*]

The *S. tiliæ*, much more common however on the Elm, the *S. demi-paon*, *S. populi*, *S. querci*, &c., compose this subgenus. They are heavy Insects, and the inferior wings project beyond the superior, as in several of the genus Bombyx(1).

Our third division, that of the SESIADES, comprises those in which the antennæ are always simple, fusiform and elongated, and frequently terminated as in the preceding subgenera, by a little bundle of setæ or scales; in which the inferior palpi, slender and narrow, have three very distinct joints, the last tapering to a point; and where the extremity of the posterior tibiæ is armed with very stout spines. The abdomen in most of them is terminated by a sort of brush.

The caterpillars feed on the internal part of the stems or roots of plants, like those of the Hepiali and Cossi, are naked, without a posterior horn, and construct their cocoons in these stems with the debris of the substance on which they have fed.

SESIA.

Where the antennæ are terminated by a little tuft of scales. The wings are horizontal and marked with transparent spots. The scales of the posterior extremity of the abdomen form a brush. Several of these Insects bear a close resemblance to Wasps or other Hymenoptera, to Diptera, &c.(2)

THYRIS, Hoff. Illig.

The Thyrides resemble the Sesiæ, but their antennæ are much more slender, almost setaceous, and destitute of the terminal tuft. Their wings are angular and dentated. Their abdomen terminates in a point.

M. Bois-Duval, whose knowledge of Lepidoptera in general, and of those in Europe particularly, is not inferior to that of our most celebrated entomologists, and who is about to publish a Monograph of the Zygænides that has received the approbation of the Royal Academy of Sciences, has observed the metamorphosis of the most known species(3).

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(1) See Encyc. Méthod., article *Smerinthe*; and Godart, op. cit.

(2) See the Monographs of the *Sesiæ* by Laspeyres, Hübner, Godart, &c.

(3) *Sphinx fenestrina*, Fab.; Lat., Ibid.

Ægocera, Lat.

Where the antennæ are also destitute of the tuft of scales, but evidently thickened in their middle and fusiform; the second joint of the inferior palpi is furnished with a bunch of hairs, projecting in the form of a rostrum. The abdomen terminates in a simple point. The wings are tectiform and entirely covered with scales. Their metamorphoses are unknown(1).

The fourth and last section of the Sphinges, that of the Zygænides, is composed of Lepidoptera, in which the antennæ, always terminated in a point destitute of a tuft, are sometimes simple in both sexes, fusiform or resembling a ram's horn, and sometimes but slightly thickened in the middle, almost setaceous, pectinated in both sexes, or at least in the males, and where the inferior palpi are of a moderate size or small, almost cylindrical, and always formed of three distinct joints. The wings are almost tectiform, and exhibit transparent spots in many. There is no terminal brush to the abdomen. The spurs of the posterior extremity are generally small.

The caterpillars live exposed on various leguminous plants. They are cylindrical, usually pilose, without a posterior horn, similar to those of different species of Bombyx, and form a fusiform or ovoid cocoon of silk, which they attach to the stems of plants. The habits of these Insects have been well described by M. Bois-Duval, in the work I have just mentioned. These Lepidoptera have been distinguished in France by the names of *Sphinx-béliers*, *Papillons-phalènes*, &c.

Zygæna.

The Zygænæ are not found in the western continent. Their antennæ are simple in both sexes, and terminate abruptly in a fusiform club, or one resembling a ram's horn; their inferior palpi extend beyond the clypeus, and are pointed at the extremity.

Z. filipendulæ; Sphinx filipendulæ, L.; Rœs., Insect., I, Class II, Pap. Noct., lvii. Black or bluish-green; six red spots on the superior wings; the inferior ones red, with their posterior margin the colour of the body.

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(1) *Bombyx venulia*, Fab. See Lat., Gen. Crust. et Insect., IV, p. 211; Dalm., Anal. Entom., p. 49; it would perhaps be more in conformity with the natural order, if this subgenus were placed near Agarista.

The caterpillar is lemon-yellow, slightly pilose, with five series of black spots along the body. It spins a straw-coloured, glossy, elongated and fusiform cocoon on the stems of plants. Its surface is wrinkled or plaited. The perfect Insect appears in July(1).

SYNTOMIS, Illig.

Only differing from Zygæna in the antennæ, which are not so thick, and insensibly fusiform and slender. The inferior palpi are shorter and obtuse(2).

ATYCHIA, Hoff. Illig.

Where the antennæ are simple (in the females), or bipectinate (in the males), according to the sex; the inferior palpi are densely pilose and extend considerably beyond the clypeus. The wings are short, and the extremity of the posterior tibiæ is furnished with very strong spines(3). The

PROCRIS, Fab.

Approaches Atychia in the antennæ; but the inferior palpi are shorter and not hairy. The wings are long, and the spurs of the posterior tibiæ are small.

P. statices; Sphinx statices, L.; *P. turquoise*, De Geer, Insect., II, p. 255, iii, 8—10. Body glossy green, as if gilt; inferior wings brown; antennæ of the male with two series of black setæ, those of the females somewhat serrated.

In the other Lepidoptera of this division, the antennæ of both sexes are bipectinated or furnished with a double row of elongated teeth. Those which have a distinct proboscis form the subgenus Glaucopis of Fabricius(1), and those in which that organ is wanting or is not distinct that of Aglaope(2).

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(1) Lat., Gen. Crust. et Insect., IV, 211; See also the Hist. Nat. des Lépid. de France.

(2) See the same works.

Near the Syntomides comes the genus PSICOTHOE, established by M. Bois-Duval, in his Europ. Lepid. Index Method., and, according to him, distinct from all other Zygænides in its moniliform antennæ and immaculate wings. It comprises but a single species, *P. Duvancelii*, found in Bengal by M. Diard and the late M. Duvauncel.

(3) Lat., Ibid., IV, 214.

There are numerous species of these two subgenera. They seem to connect themselves with the Callimorphæ.

We should remark that the genus *Stygia*, which was placed in this tribe, belongs to that of the *Hepialites*.

M. de Villiers—Ann. de la Soc. Lin. de Par., V, 473—who has given us some new observations on the *S. australia* accompanied with good figures, considers it as intermediate between the Sesiæ and the Zygænæ; but it has no proboscis. Its palpi are those of a Cossus. The antennæ are short, nowise fusiform, and more analogous to those of certain species of Bombyx than to those of the Sesiæ and Zygænæ. This Insect, even in the arrangement of the colours of the superior wings, approximates much more to Cossus and Zeuzera than to the preceding subgenera.

FAMILY III.

NOCTURNA.

In the third family of the Lepidoptera, with some few exceptions, we also find the wings bridled, when at rest, by a bristle or bundle of setæ arising from the exterior margin of the lower ones, and passing into a ring or groove in the under part of the upper ones. The wings are horizontal or inclined and sometimes rolled round the body. The antennæ gradually diminish in thickness from base to point, or are setaceous.

This family, according to the system of Linnæus, forms but the single genus

Phalæna, Lin.

These Lepidoptera seldom fly but at night or after sunset. Several have no proboscis. Some of the females are destitute of wings, or have but very small ones. The caterpillars most commonly spin a cocoon; the number of their feet varies from ten to sixteen(1). The chrysalides are always rounded, or without angular elevations or points.

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(1) Lat., Gen. Crust. et Insect., IV, 214; it is the genus *Charidea* of Dalman.
(2) Lat., Ibid., idem; see also Godart, Hist. des Lépid. de France.

The classification of this family is very embarrassing, and with respect to it our systems are as yet merely imperfect essays or rude sketches(2). We divide it into ten sections. The first nine are composed of those species in which the wings are perfectly entire, or without digitations. All those that in their caterpillar state live almost exposed or in fixed domicils, several of which have at least sixteen feet, and which, in their perfect state, have their superior palpi very small or entirely concealed, the wings more or less triangular, horizontal or tectiform and not folding round the body, will compose the first eight. The last of these latter, or the eighth, is the only one in which the caterpillars have fourteen feet, two of them anal. If the same number be found in some others, then the two last are wanting.

The two divisions *Attacus* and *Bombyx* of the genus Phalæna of Linnæus correspond to the four first sections. The proboscis is most frequently rudimental or very small, and its two threads are not united. The inferior palpi, those of a small number excepted, are small and almost cylindrical. The antennæ, at least in the males, are pectinated or serrated. The wings are horizontal or tectiform, and in several the inferior ones project beyond the others when at rest, and sometimes are also destitute of that bristle or bridle which connects them with the latter. The thorax is always smooth, as well as the abdomen, and woolly. The latter is usually very voluminous in the females. The cocoon of the chrysalis is usually well felted and solid.

Although the Nocturna of the fourth section are closely allied to those of the preceding ones, we find a character in their caterpillars perfectly unique in this order: the anal feet are wanting, while all those of the three preceding sections have sixteen.

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(1) De Geer, in one species, counted eighteen, all membranous, II, p. 245, and I, xxx, 20; xxxi, 13—16.

(2) We are frequently compelled to borrow characters taken from the caterpillar. If this be disregarded, we shall be compelled to suppress a great number of genera. I will mention for instance that of Phalæna proper, or Geometra. If we consider only the perfect Insect, it is impossible to distinguish generically several species, such as the *prodromaria, betularia* and *hirtaria* from Bombyx: it is also evident that we could not separate from them *Platypterix* and other genera.

The type of the first section, that of the HEPIALITES, is the genus *Hepialus* (*Hepiolus* of some authors) of Fabricius, and the *Cossus* of the same. The caterpillars are rare, and remain concealed in the heart of the plants on which they feed; their cocoon is mostly formed of particles of the matter that nourishes them. The margin of the abdominal annuli of the chrysalis is dentated or spinous. The antennæ of the perfect Insect are always short, and most frequently present but one sort of small, short, rounded and crowded teeth. Those of the four others are always terminated by a simple thread; but they are furnished inferiorly in the males with a double line of setæ. The proboscis is always very short, and but slightly apparent. The wings are tectiform and usually elongated. The last abdominal annuli of the females form an elongated oviduct or sort of tail. The caterpillars of these Insects are very injurious to several kinds of trees and other useful vegetable productions.

Sometimes the antennæ, almost similarly formed in both sexes, have but very short teeth, arranged in one or two lines.

HEPIALUS, Fab.

Distinguished by their almost granular antennæ, which are much shorter than the thorax. The inferior wings are usually destitute of a bridle.

The caterpillars live in the ground and feed on the roots of plants.

H. humuli, Fab.; Harr., Exp., of Eng. Ins., IV, a—d. The superior wings of the males are silver-white and immaculate; those of the female yellow with red spots.

The caterpillar devours the root of the Hop, and is extremely noxious in those districts where that plant is extensively cultivated(1).

COSSUS, Fab.

Where the antennæ, at least as long as the thorax, present on their inner side a range of small, lamellated teeth, short, and rounded at the end.

The caterpillars live in the interior of trees, on which they feed;

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(1) For the other species, see Fabricius, Esper, Engramelle, Hübner, Godart, Donovan, &c.

the cut fragments enter into the composition of their cocoon. The chrysalis, at the moment the Insect is about to be developed, advances to the mouth of the aperture through which it is to issue.

C. ligniperda, Fab.; Rœs., Insect. I, class II, Pap. Noct. XVIII. Rather more than an inch in length; cinereous-grey with numerous, small, black lines on the upper wings, forming little veins, mixed with white; posterior extremity of the thorax yellowish, with a black line.

The caterpillar, which is found in the spring, resembles a thick worm; it is reddish, with transverse bands of blood-red. It lives in the heart of the Willow and Oak, but particularly in the Elm. It disgorges an acrid and fetid humour, contained in spacious internal reservoirs, which it uses apparently to soften the wood(1).

STYGIA, Drap.—*Bombyx*, Hüb.

Where the antennæ are furnished throughout their whole length with a double series of short, narrow teeth, dilated and rounded at the end(2).

Sometimes the antennæ vary greatly—according to the sex; those of the males are furnished inferiorly with a double range of hairs, and terminated by a thread; those of the females are entirely simple, but cottony at base.

ZEUZERA, Lat.—*Cossus*, Fab.

The caterpillar of a beautiful species—*Cossus æsculi*, Fab.—with a white body, blue rings on the abdomen, and numerous points of the same colour on the superior wings, lives in the Apple and Pear trees, &c., and frequently in their very heart(3).

Our second section, that of the BOMBYCITES, is distinguished from the preceding one and the third, by the following characters: the proboscis always very short, and merely rudimental; wings either extended and horizontal or tectiform, but the lower ones extending laterally beyond the others; antennæ of the males entirely pectinated.

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(1) Add *Cossus teretra*, Fab.;—*Phalæna strix*, Cramer;—*Cossus lituratus*, Donovan;—*C. nebulosus*, Donov. [For American species, see Bois-Duval and Le Conte, op. cit. *Am. Ed.*]

(2) *Stygia australis*, Lat., Gener. Crust. et Insect., IV, 215; Godart, Hist. Nat. des Lépid. de France, III, 169, xxii, 19. See also the Memoir of Villiers, already mentioned, in the Ann. de la Soc. Lin. de Par., V. North America produces another species. The antennæ differ from those of a Cossus, so that this subgenus may be retained; the abdomen terminates in a little brush.

(3) Rœs., Insect., III, xlviii, 5, 6;—*Cossus pyrinus*, Fab.; *C. scalaris*, ejusd.; *Phalæna scalaris*, Donov.;—*P. mincus*, ejusd.

The caterpillars live in the open air, and feed on the tender parts of plants. Most of them form a cocoon of pure silk. The margin of the abdominal annuli is not dentated in the chrysalis.

We will form a first subgenus with those species in which the wings are extended and horizontal, or the Phalænæ *attacus* of Linnæus, retaining the name

SATURNIA, Schr.

Given to it by M. Schrank, uniting with it the *Agliæ* (*Bombyx tau.*, Fab.) of Ochsenheimer. It comprises the largest species, the wings of which are frequently fenestrate, or marked with diaphanous spots. Such are the

S. Atlas of China, the *B. hesperida*, *B. cecropia*, the *B. luna*, where the inferior wings are prolonged into a sort of tail, &c. The silk of two other species of the same division, the *Bombyx mylitta* of Fabricius, and the *Phalæna cynthia* of Drury—Insect. II, vi, 2(1), has been employed in Bengal from time immemorial. I have satisfied myself by a Chinese MS. on this subject, sent to me by M. Huzard, that the caterpillars of these Bombycites were the *wild silk-worms of China.* I suspect that part of the silks, procured by the ancients in their maritime commerce with the inhabitants of India, proceeded from the silk of these caterpillars.

But five species of this subgenus(2) are found in Europe. The most common is the

S. pavonia major; *B. pavonia major*, Fab.; Rœs., Insect. IV, xv, xvii. The largest species found in France. It is five inches in width; wings extended; body brown, with a whitish spot at the anterior extremity of the thorax; wings round, sprinkled with grey; a large, black, ocellated spot, traversed by a transparent line, surrounded by an obscure fulvous circle, by a white semicircle, by a second that is reddish, and by another black circle, on the middle of each wing.

The caterpillar, that lives on leaves of different trees, is green, with blue tubercles, arranged in rings from which issue long clavate hairs. In the month of August it spins an oval cocoon, narrowed into a blunt point with a double neck, the interior of which is partly formed of elastic and convergent threads that facilitate the egress of the Insect, but prevent the ingress of enemies. The silk is very strong and adhesive. The perfect insect appears in the May of the following year(1).

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(1) Trans. Lin. Soc., VII, p. 35.

(2) Authors mention but four; a fifth has lately been discovered, now in the collection of M. Bois-Duval, that is perfectly distinct.

The superior wings of the other Bombycites are tectiform, and the exterior margin of the inferior ones project almost horizontally —*alæ reversæ*—beyond them.

Sometimes their palpi project in the manner of a rostrum, and their inferior wings are frequently dentated. The Insect resembles a bundle of dead leaves. These species form the genus

LASIOCAMPA(2).

Those, in which the inferior palpi are not remarkably salient, compose the subgenus

BOMBYX proper(3).

B. mori, L.; Rœs., Insect., III, vii, ix. Whitish, with two or three obscure and transverse streaks; a lunated spot on the superior wings.

The caterpillar is well known by the name of *Silk-worm*. It feeds on the leaves of the Mulberry, and spins an oval cocoon of a close tissue with very fine silk, usually of a yellow colour, and sometimes white. A variety is now preferred, which always yields the latter.

The Bombyx which produces it is originally from the northern provinces of China. According to Latreille, the city of Turfan, in Little Bucharia, was for a long time the rendezvous of the western caravans, and the chief entrepot of the Chinese silks. It was the metropolis of the Seres of Upper Asia, or of the Serica of Ptolemy(1). Driven from their country by the Huns, the Seres established themselves in Great Bucharia and in India. It was from one of their colonies, Ser-hend (*Ser-indi*), that Greek missionaries, in the reign of Justinian, carried the eggs of the silk-worm to Constantinople. At the period of the first crusades, the cultivation of silk was introduced into the kingdom of Naples from the Morea, and several centuries afterwards, under the administration of Sully particularly, into France. Silks were also procured by the ancients, either by sea or land from Pegu and Ava, or the Oriental Seres, those most commonly mentioned by the earlier geographers. Some of the northern Seres settled in Great Bucharia, according to a passage of Dionysius the historian, seem to have made it their particular business. It is well known that silk was formerly sold for its weight in gold, and that it is now a source of great wealth to France.

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(1) For the other species, see Fab., Syst. Entom., first division of *Bombyx*; and Oliv., Encyc. Méthod., first division of the same genus.

(2) The *B. quercifolia, populifolia, betulifolia, illicifolia, potatoria*, of Fabricius. This subgenus forms part of the genus *Gastropacha* of Ochsenheimer.

M. Banon of Toulon, to whose friendship I am indebted for many Insects collected by him in Cayenne and the Levant, has given me a Lepidopterous Insect, having all the characters of a Lasiocampa, but furnished with a very distinct proboscis. It seems to form the passage from this subgenus to the *Calyptra* of Ochsenheimer.

(3) This generic appellation has been improperly suppressed by Ochsenheimer. We will apply it generically to all the species of his genus *Gastropacha*, in which the inferior palpi do not project in the manner of a rostrum.

B. neustria, Fab.; Rœs., Insect., I, Class II, Pap. Noct., vi. Yellowish with a band or two transverse, fulvous-brown stripes on the middle of the superior wings. The female deposits her eggs round branches of trees in the manner of a ring or bracelet.

The caterpillar is striped longitudinally with white, blue, and reddish, whence its French specific name of *livrée*. It lives in society and is very injurious to fruit trees. It forms a very thin cocoon intermixed with a whitish farina.

B. processionnea, Fab.; Reaum., Insect., II, x, xi. Cinereous; wings of the same colour; two obscure stripes near the base of the upper ones, and a third, blackish, a little beyond their middle, all transverse.

The body of the caterpillars is obscure-cinereous with a blackish back, and some yellowish tubercles. They live in society on the Oak, spin in common, when young, a tent, beneath which they are sheltered, change their domicil frequently until after their third change of tegument, when they become stationary, and form a new dwelling in the same manner resembling a sort of sac and divided internally into several cells. They usually issue from it, in the evening, in procession. One of them is at the head and acts as a guide, then come two, in the next line three, then four, and so on, each line regularly increasing by a unit. They all follow the course of the leader. Each one spins a cocoon, which is placed in contact with that of its neighbour, and mingles the hairs of its body in its tissue. These hairs, as well as those of several other species, are very small and fine, penetrate into the skin, and occasion violent itchings and swellings. The

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(1) Between the Ganges and the Eastern Ocean, according to that author. It was this circumstance that induced the Romans to name silk, *Sericum*. Hence their *serica vestis*. *Am. Ed.*

B. pythio-campa is a species analogous to the processionnea.

The inhabitants of Madagascar employ the silk of a caterpillar, which also forms large communities. The nest is sometimes three feet in height, and so closely are the cocoons packed in it, that there is no hiatus to be found. A single nest yields five hundred cocoons(1).

The third section of the Nocturna, that of the PSEUDO-BOMBYCES, is composed of Lepidoptera, in which, as well as in the following ones, the inferior wings are furnished with a bridle which fixes them to the superior, when at rest. They are then entirely covered by the latter, both being tectiform or horizontal, but with the inner margin overlapped. The proboscis, towards the latter end of the tribe, begins to lengthen, and, in the last subgenera, even scarcely differs from that of other Lepidoptera, except in being somewhat shorter. The antennæ are entirely pectinated or serrated, at least in the males. All their caterpillars live on the exterior parts of plants.

We will first separate those species in which the proboscis is very short, and nowise adapted for suction.

The caterpillars of some, and the greater number, live exposed and do not construct portable dwellings.

Of these, some are elongated, furnished with ordinary feet well adapted for walking; the annuli of the body are not soldered above.

Sometimes both sexes are provided with wings adapted for flight.

SERICARIA, Lat.

Where the superior wings present no dentations in their inner margin.

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(1) It belongs to the subgenus *Sericaria*.

S. dispar; B. dispar, Fab.; Rœs., Insect., I, Class II, Pap. Noct. iii. The male much smaller than the female, his upper wings brown with undulating blackish stripes; the female whitish, with black spots and streaks on the same wings. She covers her eggs with the numerous hairs on the extremity of her abdomen. The caterpillar is very often injurious to fruit-trees(1).

NOTODONTA, Ochs.

Where the inner margin of the superior wing is dentated.

This subgenus connects itself with certain Noctuæ(2).

Sometimes the females are almost apterous, as in

ORGYIA, Ochs.

The caterpillars are furnished with crests and pencils of hairs.

O. antiqua; B. antiqua, Fab.; Rœs., Ibid., xxxix, the female; iii, Class II, Pap. Noct., xiii, the male. Superior wings of the male fulvous, with two transverse blackish stripes, and a white spot near the inner angle. The abdomen of the female is very voluminous(3).

We now come to Pseudo-Bombyces, whose caterpillars are compelled to crawl, their feet being short, and even the squamous one being retractile. Their body is oval, resembling that of an Oniscus, and its skin is soldered above from the second ring, so that it forms an arch under which the head is withdrawn.

These species form the subgenus

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(1) The *Bombyx versicolor, bucephala, coryli, pudibunda, abietis, anachoreta*, of Fabricius, or the genera *Endromis, Liparis, Pygæra*, and several species belonging to that of the *Orgyia* of Ochsenheimer.

(2) The Notodontæ of the same, with the exception, however, of the species called *palpina*, which on account of its large and compressed palpi, and spirally rolled proboscis, should form a separate subgenus, connecting the Notodontæ of that savant with his *Calyptræ*, and which I place at the head of the Noctuæ, in order to proceed thence to *Xylena, Cuculia*, &c.; some of the Notodontæ have the thorax and crest, a character which appears more peculiar to this latter section. There are some of them in which the inferior palpi are strongly compressed. See our general observations on that division of the Nocturnæ.

(3) Add *O. gnostigma*, Ochs. The others will be Sericariæ.

LIMACODES, Lat.

Their caterpillars seem to represent, in this division, those of certain Diurnal Lepidoptera, such as the Polyommati(1).

The last of the Pseudo-Bombyces, without an apparent or at least useful proboscis, also present another anomaly in their first state. Their caterpillars, like those of several Tineites, live in portable dwellings consisting of a silken tube, on which they fix fragments of stems or twigs of various plants, forming little rods laid one over the other. These habitations resemble those of the larvæ of certain Phryganeæ. Very remarkable ones are found in the East Indies and Senegal.

These Lepidoptera, united by Hübner with the Tineæ, compose the subgenus

PSYCHE, Schr.(2)

The last Pseudo-Bombyces, which by the disposition of their colours seem to represent the Diurna called *damiers*, are furnished with a very distinct proboscis, which, when unrolled, extends far beyond the head, as in

CHELONIA, Godart.—*Arctia*, Schr.—*Eyprepia*, Ochs.

Where the wings are tectiform, the antennæ of the males pectinated, the inferior palpi densely pilose, and the proboscis is short.

C. chrysorrhæa; Bombyx chrysorrhæa, Fab.; Rœs., Insect. I, Class II, Pap. Noct., xxii. Wings white and immaculate; posterior extremity of the abdomen fulvous-brown.

In certain years the caterpillar of this species strips whole woods of their leaves.

E. caja; Bombyx caja, Fab.; Rœs., Ibid., i. Head and thorax brown; superior wings of the same colour with irregular white streaks; inferior wings and back of the abdomen red, with bluish-black spots.

The caterpillar which lives on the Nettle, Lettuce, Elm, &c., has received the name of *hedge-hog*, or *bear*, on account of its long and numerous hairs. It is blackish-brown with rings of blue tubercles(1).

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(1) The *Hepialus testudo, asellus, bufo*, Fab. See Godart, Lépid. de France, IV, 2791, xxviii, 1, 2.

(2) See Ochs., Godart, &c.

Callimorpha, Lat.—*Eyprepia*, Ochs.

Where the wings are also tectiform, but the antennæ, at most, ciliated in the males; the inferior palpi are merely covered with small scales, and the proboscis is long.

C. Jacobeæ; *Bombyx Jacobeæ*, Fab., Rœs., Insect., Class II, Noct. Pap., xlix. A very common species in France. Black; superior wings with a line and two points of carmine; the inferior ones, carmine margined with black.

The caterpillar is yellow, with black antennæ; it lives on the Groundsel(2).

Lithosia, Fab.

Where the wings are laid horizontally on the body(3).

The fourth section of the Nocturna, that of the Aposura(4), is removed, as we have observed in the general divisions of this family, by a unique character, viz. the absence of the anal feet of the animal in its larva state. The posterior extremity of the body terminates in a point, which in several is forked, or even presents two long, articulated, and movable appendages, forming a sort of tail. With respect to their proboscis, palpi, and antennæ, these Insects are but slightly removed from the preceding ones. Some, such as the

Dicranoura, Godart,—*Cerura*, Schr.—*Harpyia*, Ochs.

Have the external appearance of the Sericariæ and Cheloniæ; the antennæ of the males terminate in a simple and curved thread. The posterior extremity of the body of the caterpillars is forked(5).

Some others, such as the

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(1) For the other species, see Lat., Gener. Crust. et Insect., IV, p. 220; Ochsenheimer and Godart, Hist. Nat. des Lépid. de France.

(2) See the same works.

(3) Idem.

(4) Anus without feet, a character peculiar to the caterpillars of this tribe, which forms a lateral branch leading to the Phalænites.

(5) See Ochsenheimer, Godart, Hübner; and Fischer, Entom. Imp. Russ.

PLATYPTERIX, Lasp.—*Drepana*, Schr.

Closely resemble the true Phalænæ., Their wings are broad, and the superior angle of the posterior extremity of the upper ones is salient or falcated. The body is slender. That of the caterpillars terminates in a simple and truncated point. They bend the edges of the leaves, on which they live and feed, and fix them in that position by means of silk. Their cocoon is very slight, and, in a word, these Lepidoptera are connected with the Dicranoura in their larvæ state, and with the Phalænites as perfect Insects(1).

Those which compose the fifth section of the nocturnal Lepidoptera, that of the NOCTUÆLITES, Lat., are similar to the preceding Insects in the figure and relative size of the wings, and in their position when at rest, but present the two following distinguishing characters: a horny, and most commonly long, spirally rolled proboscis; inferior palpi abruptly terminated by a very small or much more slender joint than the preceding one; the latter much wider, and strongly compressed.

The body of the Noctuælites is more covered with scales than with a woolly down. Their antennæ are usually simple. The back of the thorax is frequently tufted, and the abdomen forms an elongated cone; they fly with great rapidity. Some of them appear during the day.

Their caterpillars usually have sixteen feet; the others have two or four less, but the two posterior, or anals, are never absent, and in those which present but twelve, the anterior pair of the membranous ones are as large as the next. Most of these caterpillars enclose themselves in a cocoon to complete their metamorphosis.

This section embraces the Noctuæ of Linnæus.

All the generic sections made in modern times, the characters of which are rather taken from the Insect in its larva state than when perfect, belong to the two following subgenera.

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(1) The *Phalæna falcataria*, *Ph. lacertinaria*, Fab., and his *Bombyx compressa*, I at first intended to form a particular section with this subgenus, which would have been intermediate between the Pseudo-Bombyces and the Phalænites. Ochsenheimer places it at the end of the Noctuæ, to pass from the Enclidiæ to the preceding section; but the Platypterices appear to us more nearly allied in their caterpillar state to the Harpyiæ of that naturalist, than to the Enclidiæ and other Noctuæ, whose caterpillars are pseudo-geometræ.

Erebus, Lat.—*Thysania*, Dalm.—*Noctua*, Fab.

Where the wings are always extended and horizontal, and the last joint of the inferior palpi is long, slender, and naked.

They are the largest Lepidoptera of this tribe, and with the exception of one species peculiar to Spain—the *Ophiusa scapulosa*, Ochs. —are all foreign to Europe(1).

Noctua, Fab.

Where the last joint of the inferior palpi is very short, and covered with scales, as in the preceding Insects(2).

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(1) Lat., Gen. Crust. et Insect., IV, 225; Consid. Gén. sur les Crust., &c. The males of some species have pectinated antennæ, and might constitute a particular subgenus.

(2) The genus *Noctua* of Fabricius, in Ochsenheimer's History of the Lepidoptera of Europe, is divided into forty-two, from *Acronicta* to *Euclidia* inclusively. They are, for the most part, the divisions established in the Systematic Catalogue of the Lepidoptera of Vienna, transformed into genera, which the nature of our work forbids us to describe. That of Noctua, the Erebi being detached, appears to us to divide itself into two great parallel series, one of which is connected with these latter Lepidoptera, and the other with the Notodontæ. The first is composed of those Noctuæ whose caterpillars walk in the manner of *Geometræ*. Some have sixteen feet, of which the two or four anterior, of the intermediate membranous ones, are the shortest; the others have but twelve: such are the *Plusiæ*, and the *Chrysopteræ*, a genus distinguished from the preceding by the size of the inferior palpi, which bend over the head. The second series will commence with species in which the palpi are proportionally larger, the antennæ pectinated, and the proboscis is small; such are the *Notodonta palpina* (*Odonptera palpinus*, Lat.), and the *Calyptræ* of Ochsenheimer, or *Calpes* of Treitschke. Then will follow the genera *Xylena*, *Cucullia*, those Noctuæ in which the posterior margin of the superior wings is angular or dentated, those where the antennæ are pectinated, and then those in which they are simple. We will terminate these latter species with such as have a smooth thorax, some of which, of the genus *Erastia*, Id., appear to lead to Pyralis. All the caterpillars of this second series have sixteen feet, and the intermediate membranous ones of equal size; they move in a straight line. The Chrysopteræ—*Plusia concha*, Fisch., Entomog. Imp. Russ. I, Lepid., IV—with which we terminate the other series, are allied to Herminia and Pyralis. Thus the two series seem to converge and end in this large section. The *Lichenia* or *Catocala* of Ochsenheimer are large species, with almost horizontal wings, that appear naturally approximated, as well as *Ophius*, *Brephos*, &c. to Erebus. If we place them in the other series, they destroy its harmony.

The *Bombyx cyllopoda*, Dalm., Analect. Entom., 102, should form a new sub-

Among his Noctuæ proper, the caterpillars of some, and the greater number, have sixteen feet. Of these we will notice the

N. sponsa, Fab., Rœs., Insect. IV, xix. Cinereous grey; thorax crested; wings lapping: upper surface of the superior ones obscure grey, with strongly undulated black streaks, and a whitish spot divided by several black lines; that of the inferior bright red with two black bands; abdomen entirely cinereous.

The caterpillar lives on the Oak; it is grey, with some obscure and irregular spots, and little tubercles; a hump on the fifth ring surmounted by a yellow plate. This species and some others are called *Lichenées*, on account of their colour, which resembles that of a Lichen. Their four anterior membranous feet are the shortest, and they walk in the manner of the Geometræ.

N. pacta, Fab. Distinguished from the others by the red colour of the under part of its abdomen. It is only found in the north of Europe(1).

The caterpillars of some have but twelve feet. The superior wings of the perfect Insect are frequently ornamented with golden or silver spots. Such are the two following species(2).

N. gamma, Fab., Rœs., Ins., I, Class III, Pap. Noct., V. The thorax crested; superior surface of the upper wings brown, with lighter shades of the same colour, and a golden spot forming a lambda or gamma, laid on the side, in the middle. By pressure, two tufts of hairs may be made to protrude from the extremity of the male's abdomen. The caterpillar lives on various culinary vegetables.

N. chrysitis, Fab.; Esp., Noct., cix, fig., 1—5. Superior wings light-brown, traversed by two bands of the colour of polished brass.

Some caterpillars, like those of the *N. verbasci*, *N. artemisiæ*, *N. absinthii*, &c., have the habit of feeding on the flowers of plants peculiar to them(3).

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genus. It is very remarkable, inasmuch as the two posterior legs are shorter than the others, unarmed, and almost useless for the purpose of locomotion. This Insect, on account of its pectinated antennæ, distinct proboscis, and antennæ which are twice the length of the head, should be placed near the genus *Calyptra* of Ochsenheimer, or our Herminiæ.

(1) These two species belong to the genus *Catocala*, Ochsenheimer.

(2) Genus *Plusia* of the same.

(3) They belong to the genus *Cucullia* of Schrank and other Lepidopterologists. For the other species, see Olivier, Encyc. Méthod., art. *Noctuelle*; Lat. Gen. Crust. et Insect., IV, p. 224, and in particular Ochsenheimer's work on the

Other species of Noctuæ have pectinated antennæ, like the *N. graminis*—*P. graminis*, L.—whose caterpillar sometimes ravages the fields of Sweden.

The sixth section of Nocturnal Lepidoptera, or that of the PHALÆNÆ TORTRICES, L., is closely allied to the two preceding ones. The superior wings, of which the exterior margin is arcuated at base and then narrowed, their short and wide figure forming a truncated oval, give a very peculiar appearance to these Insects. They are called in France *Phalènes à larges épaules*, and *Phalènes à chappe.* They have a distinct proboscis, and their inferior palpi are usually almost similar to those of the Noctuæ, but somewhat salient.

They are small and prettily coloured; their wings are tectiform, but flattened almost horizontally, and always laid on the body. In this case the upper ones are slightly crossed along the inner margin.

Their caterpillars have sixteen feet, and their body is closely shorn or but slightly pilose. They twist and roll up leaves of trees, connecting various points of their surface at different times by layers of silken threads running in one direction, and thus form a tube in which they reside, and feed in tranquillity on their parenchyma. Others form a nest by connecting several leaves or flowers with silk. Some of them inhabit fruits.

The posterior extremity of the body is narrow in several; they are styled by Reaumur "*chenilles en forme de poisson.*" Their cocoon has the figure of a bateau, and is sometimes of pure silk, and at others mixed with foreign matters.

The Tortrices compose the subgenus

PYRALIS, Fab.(1)

P. pomana, Fab.; Rœs., Insect., I, Class IV, Pap. Noct.,

Lepidoptera of Europe, and the Hist. Nat. des Lépid. de France of Godart, now continued by M. Duponchel, well known to entomologists by his interesting Monograph of the genus Erotylus, already quoted, and other Memoirs.

(1) Certain divisions established in our Gen. Crust. et Insect., IV, 230, divis. 2 and 11, it has appeared to us—Fam. Nat. du Règ. Anim., 476—might be formed into separate subgenera.

Those species—*Tortrix dentana*, Hübn.—in which the wings have a peculiar appearance, the upper ones being somewhat raised at the exterior margin, and inclined on the opposite one, and of which the caterpillars have membranous feet of a peculiar form, compared by Reaumur to wooden legs, compose the subgenus XYLOPODA. Others—*Pyralis rutana, umbellana, heracleana*—in which the inferior palpi curve over the head like horns and terminate in a point, form that of the Volucræ—VOLUCRA.

xiii. Cinereous-grey; superior surface of the upper wings finely striped with brown and yellowish, with a large spot of golden-red.

The caterpillar feeds on the seeds of the apple, and the female deposits her eggs on their germ.

P. vitis, Bosc., Mem. de la Soc. d'Agric., II, iv, 6. Superior wings deep greenish, with three oblique, blackish bands, the last terminal.

Its caterpillar is very injurious in vineyards.

P. prasinaria, Fab.; Rœs., Insect., IV, x. The largest species known; superior surface of the upper wings light green, with two oblique white lines.

On the Oak, &c. Its caterpillar is one of those that Réaumur compares to a fish. Its cocoon has the form of a batteau(1).

The seventh section of the Nocturna, that of the GEOMETRÆ—*Phalænites*, Lat.; *P. geometræ*, L.—comprises Lepidoptera in which the body is usually slender, the proboscis either nearly wanting, or generally but slightly elongated, and almost membranous. The inferior palpi are small, and almost cylindrical. The wings are ample, extended, or tectiform and flattened. The antennæ of several males are pectinated. The thorax is always smooth. The caterpillars usually have but ten feet; the others present two more, and those at the anus always exist. Their peculiar mode of progression has caused them to be styled *Arpenteuses*, *Geometræ*, or *Measurers*. When about to advance, they first cling with their anterior or squamous feet, then elevate their body so as to form a ring, in order to approximate the posterior extremity of the body to the anterior, or that which is fixed; they cling with the anal feet, disengage the first, and move the body forwards, when they recommence the same operation. Their attitude when at rest is singular. Fixed to a branch of some plant by the anal feet only, their body remains extended in a straight line in the air, and absolutely motionless. So closely does the skin resemble the branch in its colour and inequalities, that it

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Finally, others again in which the wings are narrow and elongated, and the inferior palpi longer and salient, species which closely resemble the Crambi of Fabricius, near which they must probably be placed, constitute a third subgenus, PROCERATA, of which the *Pyrulis saldonana*, Fab., is the type.

For the other species, see Fabricius and Hübner.

(1) Messrs Lepeletier and Serville, with the *Pyralis Godarti*, previously described by them, have formed the new genus MATRONULA, differing from others of this division in the following characters; the labial palpi shorter than the head, with rather indistinct and almost glabrous joints; anterior coxæ strongly compressed, and at least as long as the thighs.

is easy to confound them. In this way and at an angle of forty-five degrees, or more, with the limb to which they are attached, these animals remain for hours and even days.

The chrysalides are almost naked, or their cocoon is extremely thin, and poorly furnished with silk.

This section, exclusive of the caterpillars, contains but one subgenus, or

PHALÆNA proper.

The caterpillar of the *Phalæna margaritaria*, Fab., has twelve feet(1); the others have but ten.

P. sambucaria, L.; Rœs., Insect. I, Class III, Pap. Noct., VI. One of the largest that inhabits France; sulphur-coloured; wings extended and marked with brown, transverse stripes; the inferior prolonged at the external angle in the manner of a tail, where two small blackish spots may be observed.

The caterpillar is brown, resembling a little stick both in form and colour. The head is flat and oval. With this species and some others, of which the inferior wings have a similar shape, Dr Leach has formed the genus *Ourapteryx*.

P. syringaria, L.; Rœs., Ibid., X, where the antennæ are pectinated in the male, whose wings are *jaspered* by a mixture of yellowish, brown, and reddish.

The caterpillar has four stout tubercles on its back, in addition to smaller ones, and a horn or hook on the eighth ring.

P. grossularia, Rœs., Ibid., II. Wings white, spotted with black; two bands of pale yellow on the upper ones, one near the base, and the other a little beyond the middle.

The caterpillar is bluish-grey above, spotted with black; inferior side and venter yellow, dotted with black.

The female of the *Ph. brumata*, L., as well as those of some analogous species, have mere rudiments of wings. They only appear in winter(2).

De Geer describes a species (*Ph. à six ailes*), the male of which appears to have six wings, the inferior ones with a little appendage which is laid on them(3).

The eighth section of the Nocturna, that of the DELTOIDES,

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(1) The type of my subgenus METROCAMPE.

(2) They form my subgenus HYBERNIA.

(3) For the other species, see Fabricius and Hübner.

Lat.(1), consists of species very analogous to true Phalænæ, but whose caterpillars have fourteen legs, and roll up leaves. In the perfect Insect the inferior palpi are elongated and recurved. Its wings and body, on the sides of which the former are extended horizontally, form a sort of delta, marked by a re-entering angle in the posterior side, or appearing to be forked. The antennæ are usually pectinated or ciliated.

The Deltoides form the subgenus

Herminia, Lat.

Which belongs to the division of the *Pyralides* of Linnæus, and is composed of the genus *Hyblæa*, Fab., and of several of his *Crambi*(2).

The ninth section of the nocturnal Lepidoptera, that of the Tineites—*Tineites*, Lat.; *Phalænæ tineæ*, L., and most of his *P. pyralides*—comprises the smallest species of this order. Their caterpillars are always closely shorn, furnished with sixteen feet at least, and rectigrade, living concealed in dwellings fabricated by themselves, either fixed or movable. Here the wings form a sort of elongated and almost flattened triangle, terminated by a re-entering angle; such are the *Pyralides* of Linnæus(3); they have four distinct and usually exposed palpi. There, the superior wings are long and narrow, sometimes moulded on the body, and forming a sort of rounded roof to it, sometimes almost perpendicularly decumbent and laid on the sides, and frequently raised or ascending posteriorly like the tail of a cock. In both cases the inferior wings are always wide and plaited. These species also frequently have the four palpi exposed.

All the caterpillars, whose habitations (sheaths) are fixed or immovable, are the *Pseudo-Tineæ* of Reaumur; those which construct portable ones, which they transport with them, are true Tineæ.

The substances on which they feed, or on which they reside, furnish the materials of the structure.

Of those sheaths which are composed of vegetable matters, many are very singular. Some, like those of the Adelæ, are covered exteriorly with portions of leaves laid one over the other and forming a sort of flounce: others are in the form of a bat and sometimes dentated along one of their sides. The material of some of them is diaphanous, and as if cellular or divided by scales.

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(1) In the first edition of this work, this section comprised all the *Phalænæ pyralides* of Linnæus. A complication of characters, however, was the result, which disappears by merely including the Herminiæ. That of the Tinæites will then consist exclusively of the *Tineæ*, and *Pseudo-Tineæ* of Réaumur.

(2) Lat., Gen. Crust. et Insect., IV, 228.

(3) They might form a separate section.

The caterpillars of the true Tineæ, commonly called *Moths*, clothe themselves with particles of woollen stuffs, which they cut with their jaws and on which they feed, hairs of furs, and those of the skins of animals in zoological collections, united by silk. They know how to lengthen their sheath, or to increase its diameter by slitting it and adding a new piece. In these tubes they undergo their metamorphoses, after closing the orifices with silk.

Those, who wish to become well acquainted with the manner in which they construct these habitations, and to acquire a knowledge of their various forms and materials, must have recourse to the Memoirs of Réaumur, Rœsel and De Geer.

The Pseudo-Tineæ content themselves with mining the interior of the vegetable and animal substances on which they feed, and forming simple galleries, or if they construct sheaths either with those matters or silk, they are always fixed, and are mere places of retreat.

These caterpillars, which perforate in various directions the parenchyma of the leaves on which they feed, have been called *Mineuses* or *Miners*. They produce those desiccated spaces in the form of spots and undulating lines, frequently observed on leaves. Buds, fruits, and seeds of plants, frequently those of wheat, and even the resinous galls of certain Coniferæ, serve for aliment and habitations to others. These Insects are frequently ornamented with the most brilliant colours. In several species the superior wings are decorated with golden or silver spots, sometimes even in relievo.

Some, in which the four palpi are always distinct(1), exposed, or merely partly concealed (the superior ones) by the scales of the clypeus, salient, and of a moderate size, resemble Phalænæ—*P. pyralides*, L.;—their tectiform wings most frequently flattened, or but slightly raised, form an elongated triangle or sort of delta.

Sometimes the proboscis is very apparent, and serves for its ordinary use. The caterpillars of these species live on various plants.

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(1) The Yponomeutæ, one or two excepted, Œcophoræ and Adelæ are almost the only Tineites whose maxillary palpi are not very apparent, but as they may be concealed by the inferior ones, and as it is very difficult to establish in this respect a fixed and rigorous line of demarcation, we have not thought proper to divide the Tineites according to the number of those organs. M. Savigny, in his Memoirs on the invertebrate animals, has published some figures in which they have various proportions. The new genera, which he merely mentions, are unknown to us.

Botys, Lat.

These caterpillars are leaf-rollers, and do not differ externally from the others, as to their organs of respiration.

B. urticata; P. urticata, L.; Rœs., Insect., I, Phal. XIV. Thorax and extremity of the abdomen yellow; wings white, with blackish spots, forming bands.

Its caterpillar folds the leaf of the Nettle, and remains nine months in its cocoon before it becomes a nymph; it is naked and green, with a deeper stripe of the same colour along the back.

The same plant nourishes the caterpillar of another species—the *P. verticalis*, L.—Rœs., Ibid. I, Phal., 4, iv. The perfect Insect is pale-yellowish, glossy, with some obscure transverse lines most apparent underneath(1).

Hydrocampe, Lat.

This subgenus is composed of species very analogous to the preceding ones, but their caterpillars are aquatic, and usually furnished with appendages resembling long hairs, inside of which are tracheæ. They construct tubes with various sorts of leaves, in which they are sheltered(2).

Sometimes the proboscis is wanting, or nearly so, as in

Aglossa, Lat.

Where the four palpi are exposed, and the wings form a flattened triangle; there is no emargination in the extremity of the upper one.

A. pinguinalis; P. pinguinalis, L.; De Geer, Insect., II, vi, 4, 12; Reaum., Insect., III, xx, 5, 11. Superior wings agate-grey, with blackish stripes and spots. Found in houses on the walls.

Its caterpillar is naked, blackish-brown, glossy, and feeds on fatty or butyraceous substances. Réaumur called it the *Fausse-teigne-des cuirs*, because it also feeds on leather and the covers of books. It constructs a tube which it places against the body on which it feeds, and covers it with granules, most of which are taken from its excrement. According to Linnæus, it is found, though rarely, in the human stomach, where it produces more alarming symptoms than those caused by worms. I have received caterpillars of this species, from an intelligent physician whose veracity I cannot question, that were ejected from the stomach of a young female by vomiting.

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(1) The Phalænæ *forficalis, purpuraria, margaritalis, alpinalis, sanguinalis*, &c. of Fabricius.

(2) The *P. potamogata, stratiolata, paludata, lemnata, nympheata*, &c.

That of another Aglossa—the *P. farinalis*, L.—lives on flour. The perfect Insect is also frequently found on walls, where it remains motionless with the abdomen raised. The base of its upper wings is reddish margined with white posteriorly; the posterior extremity is also reddish, but forming an angular spot, and margined above by a white stripe also angular; the space comprised between these spots, or the centre, is yellowish.

GALLERIA, Fab.

Where the scales of the clypeus form a projection that covers the palpi; and the superior wings, proportionally narrower than in Aglossa, and emarginated in the posterior edge, are, as well as the inferior ones, strongly inclined and turned up posteriorly like the tail of a cock, as in many species of the following subgenera.

G. cereana, Fab.; Hübn., Tin., iv, 25. About five lines in length; cinereous; head and thorax paler, and little brown spots along the internal margin of the superior wings.

Réaumur designates its caterpillar by the name of *fausse-teigne de la cire*. It ravages hives by penetrating into the combs, constructing, as it progresses, a silken tube covered with its fæces, which are formed of the wax on which it feeds. The cocoons of their chrysalides are sometimes found collected in piles. The

G. alvearia of Fabricius approximates more closely to Tinea than to this subgenus.

His *Crambus erigatus* and the *Vinea tribunella* and *Colonella* of Hübner approach the preceding Tineites in the extent and disposition of their wings; but their inferior palpi are much longer, and these Insects, in this respect, are more nearly allied to Crambus. They might form particular subgenera.

The others, in which the superior palpi are not always very distinct, have the upper wings long, narrow, sometimes moulded on the body, and sometimes laid perpendicularly against its sides. In this state the form of the Insect is always narrow and elongated, approaching that of a cylinder or cone.

Here the inferior palpi, always large, are directed forwards; the last joint at most is turned up. The superior palpi are apparent.

CRAMBUS, Fab.

Where there is a distinct proboscis; the inferior palpi advance to the end in the manner of a straight rostrum. Found in dry pastures on various plants(1).

ALUCITA, Lat.—*Ypsolaphus*, Fab.

Where there is also a distinct proboscis; but the last joint of the inferior palpi is turned up. The antennæ are simple(2).

EUPLOCAMUS, Lat.—*Phycis*, Fab.

Where the proboscis is very short and but slightly apparent; the last joint of the inferior palpi is turned up, and the scales of the preceding one form a fascis. The antennæ of the males have a double range of barbulæ(3).

PHYCIS, Fab.

Entirely similar to Euplocamus, except in the antennæ, which at most are ciliated(4).

There the inferior palpi are entirely raised, and in several, even curved over the head.

Sometimes the inferior palpi are very apparent and of a moderate size. The antennæ and the eyes are distant.

In the two following subgenera, the inferior palpi scarcely extend beyond the front.

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(1) Fab., Entom. Syst., Supp.; and Lat., Gener. Crust. et Insect., IV, 232. See Hübner, Tin., V—VIII. The *Crambus carnellus* belongs to another subgenus, ILITHYIA.

(2) Lat., Ibid., 233; refer to the same subgenus the Crambi of divis., II, 2, p. 232.

(3) Lat., Gen. Crust. et Insect., IV, 233.

(4) *Phycis boleti*, Fab.

Tinea.

Where the proboscis is very short and formed of two little membranous and separated threads. The head is crested.

P. tapezana, Fab.; Réaum., Insect. III, xx, 2—4. Upper wings black; their posterior extremity as well as the head, white.

The caterpillar attacks cloth and other woollen stuffs on which it lies concealed in a semi-tubular sheath formed of their particles, which it lengthens as it advances. It is one of the *Pseudo-Tineæ* of Réaumur(1).

T. sarcitellæ, Fab.; Réaum., Ins., III, vi, 9, 10. Silver-grey; a white dot on each side of the thorax.

The caterpillar lives on cloth and other woollens, weaving with their detached particles mixed with silk a portable tube; it lengthens it at one end in proportion as it grows, and slits it to increase its diameter by adding another piece. Its fæces have the colour of the wool on which it feeds.

T. pellionella, Fab.; Réaum., Insect., III, vi, 12—16. Upper wings silver grey, with one or two black dots on each.

The caterpillar inhabits a felted tube on furs; it cuts the hairs at base and rapidly destroys them. The

T. flavifrontella, Fab., ravages cabinets of natural history in the same way(2).

T. granella, Fab.; Rœs., Ins. I, Class IV, Pap. Noct., xii. Its upper wings are marbled with grey, brown and black, and turned up posteriorly.

The caterpillar—*fausse-teigne des blés*—connects several grains of wheat with silk, and forms a tube from which it occasionally issues to feed upon those seeds. It is very noxious.

Ilithyia, Lat.—*Crambus*, Fab.

Where the proboscis is very distinct and of an ordinary size, and the last joint of the inferior palpi is manifestly shorter than the preceding one(1).

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(1) It approaches the Volucræ (p. 208) in its palpi and appearance, and perhaps forms a new subgenus.

(2) All the authors who have described or figured Tineites and other analogous Lepidoptera, having paid but little attention to exactness, we find it impossible to refer most of the species mentioned by them to our various subgenera.

YPONOMEUTA, Lat.

Where the proboscis is also very distinct and of an ordinary size; but the last joint of the inferior palpi is at least almost as long as the preceding.

These Insects seem to be connected with the Lithosiæ.

Y. evonymella; Tinea evonymella, Fab.; Rœs., Ins., I, Class. IV, Pap. Noct., viii. Superior wings glossy-white, with numerous black points; inferior ones blackish.

Y. padella; Tinea padella, Fab.; Rœs., Ibid., viii. Superior wings lead-grey, with about twenty black dots.

The caterpillar, like that of the *evonymella*, lives in society forming a numerous community under a web. It is sometimes so abundant on the fruit trees in Europe, the leaves of which it devours, that the branches seem to be covered with crape(2).

In the following subgenus, or the

ŒCOPHORA, Lat.

The inferior palpi are covered over the head like horns, taper to a point, and even extend to the back of the thorax.

The *Teigne des blés*, which is so destructive in the southern departments of France, and of a uniform brownish cream-colour, belongs to this subgenus.

I also refer to it the *T. harisella*, whose caterpillar, according to the observations of Hubert, Jun., forms a sort of hammock(3).

Sometimes the inferior palpi are very small and hairy. The antennæ are almost always very long, and the eyes are closely approximated.

ADELA, Lat.—*Alucita*, Fab.

These Insects are found in the woods, and several species appear with the first budding of the Oak. Their wings are usually brilliant.

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(1) *Crambus carneus*, Fab., and some other species. The antennæ of the males are marked inferiorly by a knot-like inflation.

(2) See Lat., Gen. Crust. et Insect., IV, 222; and the Hist. Nat. des Lépid. de Fr., of Godart.

(3) The *Tinea majorella, Geoffroyella, rufimitrella*, &c. of Hübner. For this and

A. Degeerella; Alucita Degeerella, Fab.; De Geer, Insect., I, xxxii, 13. The antennæ thrice the length of the body and whitish, the inferior portion black; superior wings golden-yellow on a black ground, forming longitudinal streaks, with a broad, golden-yellow, transverse band, margined with violet.

A. Reaumurella; Alucita Reaumurella, Fab. Black; superior wings golden and immaculate(1).

The tenth and last section of the Nocturnal Lepidoptera, that of the Fissipennæ (*Pterophorites*, Lat.), is closely related to the preceding one, so far as relates to the narrow and elongated form of the body and upper wings, but is removed from it, as well as from all others of this order by the four wings, or at least two, being split longitudinally in the manner of branches or fingers with fringed edges, and resembling feathers. The wings resemble those of Birds.

Linnæus comprised these Lepidoptera in his division of the *Phalænæ alucitæ*, De Geer calls them *Phalænæ-tipulæ*.

With us, as with Geoffroy and Fabricius, they constitute the subgenus

Pterophorus.

The caterpillars have sixteen feet, and live on leaves or flowers without constructing a tube.

Sometimes the inferior palpi are recurved from their origin, are entirely covered with little scales, and not longer than the head. They form the genus *Pterophorus* proper of Latreille. Their chrysalides are exposed, covered with hairs or little tubercles, sometimes suspended by a thread, and sometimes fixed to a bed of silk on leaves, &c., by means of the terminal hooks of the abdomen.

P. pentadactylus, Fab.; Rœs. Insect., I, Class IV, Pap. Noct., v. Snow-white wings; the superior divided into two slips, and the inferior into three(2).

Sometimes the inferior palpi project, are longer than the head, and have the second joint densely covered with scales, and the last

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the preceding subgenus, see the Monograph of the genus *Phycis*, in the Magas. der Entom., III, of Germar.

(1) See Fab., Entom. Syst., Supp.; Lat., Gener. Crust. et Insect., IV, 223; and Hübner, Tineæ, XIX.

(2) The other Pterophori of Fabricius, the *hexadactylus* excepted. See also Hübner and De Geer.

almost naked and turned up. The chrysalis is enclosed in a cocoon of silk. Latreille distinguishes these species by the generic appellation of ORNEODES(1).

ORDER XI.

RHIPIPTERA.

This order was established by M. Kirby under the name of *Stresiptera* (twisted wings), on certain Insects remarkable for their anomalous form and irregular habits.

From the two sides of the anterior extremity of the trunk, near the neck and the exterior base of the two first legs, are inserted two small, crustaceous, movable bodies, in the form of little elytra, directed backwards, that are narrow, elongated, clavate, curved at the extremity, and terminate at the origin of the wings(2). As elytra, properly so called, always cover the whole or the base of the latter organs and arise from the second segment of the trunk, these bodies are not true wing-cases, but parts analogous to those (*pterygoda*) we have already observed at the base of the wings in the Lepidoptera. The wings of the Rhipiptera are large, membranous, divided by longitudinal and radiating nervures, and fold longitudinally in the manner of a fan. The mouth consists of four pieces, two of which, the shortest, appear to be so many biar-

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(1) *P. hexadactylus*, Fab.; the *Ptérophore en éventail* of Geoffroy. See Lat., Gen. Crust. et Insect., IV, p. 234 and 235.

[See also for American species generally, Bois-Duval and Le Conte, op. cit. *Am. Ed.*]

(2) The *prebalanciers*, Lat.

ticulated palpi; the others inserted near the internal base of the preceding ones, resemble little linear laminæ, which are pointed and crossed at their extremity like the mandibles of various Insects; they bear a greater similitude to the lancets of the sucker of the Diptera than to true mandibles(1). The head is also furnished with two large hemispherical, slightly pediculated, and granular eyes; two almost filiform and short antennæ, approximated at base on a common elevation, consisting of three joints, the two first of which are very short, and the third very long, and divided down to its origin into two long, compressed, lanceolate branches, laid one against the other. The ocelli are wanting. The form and divisions of the trunk are very similar to those of several Cicadariæ, Psyllæ, and Chrysides. The abdomen is almost cylindrical, consists of eight or nine segments, and is terminated by pieces also analogous to those observed at the anus of the above mentioned Hemiptera. The six legs are almost membranous, compressed, nearly equal, and terminated by filiform tarsi composed of four membranous joints with, as it were, vesicular extremities; the last is somewhat larger than the others and presents no hooks. The four anterior legs are closely approximated, and the two others thrown behind. The space on the pectus comprised between these latter is very considerable, and divided by a longitudinal furrow. The posterior extremity of the metathorax is prolonged over the abdomen in the manner of a large scutellum. The sides of that metathorax which give insertion to this last pair of legs are strongly dilated behind, and form a sort of inflated shield that defends the exterior and lateral base of the abdomen.

These Insects, in their larvæ state, live between the abdominal scales of several species of Andrenæ and Wasps of the subgenus Polistes. They frisk about with a simultaneous motion of the wings and halteres. Although they appear to be removed in several respects from the Hymenoptera, I still think it is to some of those Insects, such as the Eulophi, that they are most nearly allied.

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(1) According to Savigny, their mouth consists of a labrum, two mandibles, two maxillæ, each bearing a very small uniarticulated palpus, and of a labium without palpi.

M. Peck has observed one of the larvæ—*Xenos Peckii*—which is found on Wasps. It forms an oblong oval, is destitute of feet, and annulated or plaited; the anterior extremity is dilated in the form of a head, and the mouth consists of three tubercles. These larvæ become nymphs in the same place, and, as it appeared to me when examining the nymphs of the *Xenos Rossi*, another Insect of the same order, within their own skin, and without changing their form(1).

Nature has perhaps furnished the Rhipiptera with the two false elytra of which we have spoken, to enable them to disengage themselves from between the abdominal scales of the Insects on which they have lived.

They are a sort of *Œstri* to Insects, and we shall soon find a species of Conops that undergoes its metamorphosis in the abdomen of the Bombi.

The Rhipiptera form two genera.

STYLOPS, Kirb.

The first one observed and instituted by M. Kirby. The superior branch of the last segment of the antennæ is composed of three little joints. The abdomen is retractile and fleshy.

But a single species is known; it lives on the Andrenæ.

XENOS, Ross.

Here the two branches of the antennæ are inarticulated. The abdomen, with the exception of the anus which is fleshy and retractile, is corneous.

Two species of this genus are known, one of which lives on the Wasp called *gallica*, and the other on an analogous Wasp of North America, the *Polistes fucata*, Fab.(2)

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(1) For some observations on this Insect, see a very good Memoir of M. Jurine, Sen.

(2) See the Memoir of M. Kirby, Lin. Trans., XI.

ORDER XII.

DIPTERA(1).

The distinguishing characters of dipterous Insects consist in six feet; two membranous, extended wings, with, almost always, two movable bodies above them called *halteres*(2); a sucker composed of squamous, setaceous pieces, varying in number from two to six, and either enclosed in the superior groove of a prosbosciform sheath terminated by two lips, or covered by one or two inarticulated laminæ which form a sheath for it(3).

Their body, like that of other Hexapoda, is composed of three principal parts. The number of ocelli, when any are present, is always three. The antennæ are usually inserted on the front and approximated at base; those of the Diptera of our first family resemble those of the Nocturnal Lepidoptera in form and composition, and frequently in their appendages, but in the following and greater number of families they consist of but two or three joints, the last of which is fusiform or shaped like a lenticular or prismatic palette, furnished either with a little styliform appendage, or a thick hair or seta, sometimes simple and sometimes hairy. Their mouth is only adapted for extracting and transmitting fluids. When these nutritive substances are contained in particular vessels with permeable parietes, the appendages of the sucker act as lancets, pierce the envelope, and open a passage to the fluid, which, by their pressure, is forced to ascend the internal canal to the pharynx, situated at the base of the sucker. The sheath of the latter, or the external part of the proboscis, merely serves to maintain the lancets in situ, and when they are to be employed it is bent back. This sheath appears to represent the inferior lip of the triturating Insects just as the appendages of the sucker, at least in those genera where it is most complete, seem to be analogous to the other parts of the mouth, such as the labrum, mandibles, and maxillæ(1). The base of the proboscis frequently bears two filiform or clavate palpi, composed, in some, of five joints, but in the greater number of one or two. The wings are simply veined, and most frequently horizontal(2).

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(1) *Antliata*, Fab.

(2) In order to be convinced that these organs do not represent the second wings, we must compare the thorax of a large Tipula with that of some Hymenopterous Insect, and particularly of a female Cryptocerus, where the posterior stigmata are very apparent. Here, as in all the Hymenoptera, the segment bearing the second pair of wings, is but very slightly developed or incomplete, and merely follows a small, very narrow, transverse, linear, and extremely short piece immediately under the scutellum. Next follows the metathorax, which forms that semi-segment which in my Memoir on the articulated appendages of Insects I have called *mediate*. On each side of it is a spine with two stigmata, more exterior than the spines, and situated at but a little distance from them. The thorax of these Tipulæ exhibits the same disposition, except that the semi-segment, which in the Hymenoptera gives insertion to the second wings, is here somewhat less distinct, and that no trace of wings can be perceived at either of the ends. The halteres (balanciers) occupy the precise situation of the spines, and the stigmata in like manner are exterior. It is evident then, that this posterior extremity of the thorax bearing the halteres corresponds to the mediate segment, that in which the musical organs of the male Cicadæ are placed, and which in several Acrydia of the same sex presents analogous peculiarities.

(3) This proboscis is elongated, in several species of the same family, in the manner of a long siphon.

The use of the halteres is not yet well known; the Insect moves them very rapidly. In many species, those of the last families particularly, and above the halteres, are two membranous appendages resembling the valves of a shell, and connected by one of their sides, called (*ailerons* or *cuillerons*) alulæ. One of these pieces is united to the wing and participates in all its motions, but then the two parts are nearly in the same plane. The size of these alulæ is in an inverse ratio to that of the halteres. The prothorax is always very short and frequently we can merely discover its lateral portions. In some, such as the Scenopini, certain Culices, and Psychodæ, they are prominent and tuberculous. The greater part of the trunk or thorax is composed of the mesothorax. Before, on each side, or behind the prothorax are two stigmata; two others may be observed near the origin of the halteres; those of the mesothorax, as in the Hymenoptera, are concealed or obliterated.

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(1) This anterior part of the head, called clypeus (my epistoma), is here represented by that superior portion of the proboscis that precedes the sucker and palpi.

(2) These organs, like those of the Hymenoptera, furnish good, secondary, divisional characters. I was the first who employed them. See the works of Fallen, Kirby, Meigen, Macquart, &c.

The abdomen is frequently attached to the thorax by a portion only of its transversal diameter. It is composed of from five to nine apparent annuli, and usually terminates in a point in the females; in those where the number of annuli is less, the last ones frequently form a sort of ovipositor presenting a succession of little tubes sliding into each other like the joints of a spy-glass. The sexual organs of the males are exterior in many species, and bent under the abdomen. Their usually long and slender legs are terminated by a tarsus of five joints, the last of which has two hooks, and very often two or three vesicular or membranous pellets.

All the Diptera dissected by M. Leon Dufour were provided with salivary glands, a character, according to him, common to all Insects furnished with a sucker; their structure, however, varies according to the genus(1).

Many of these Insects are noxious, both by sucking our blood and that of our domestic animals, by depositing their eggs on their body in order that their larvæ may feed on them, and by infecting our preserved meats and cerealia. Others in return are highly useful to us by devouring noxious Insects, and consuming dead bodies and animal substances left on the surface of the earth that poison the air we breathe, and by accelerating the dissipation of stagnant and putrid water.

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(1) See his "Recherches Anatomiques sur l'Hippobosque des Chevaux," Ann. des Sc. Nat., VI, 301.

The term of life assigned to the perfect Aptera is very short. They all undergo a perfect metamorphosis, modified in two principal ways. The larvæ of several change their skin to become nymphs. Some even spin a cocoon, but others never change their tegument, which becomes sufficiently solid to form a case for the nymph, resembling a seed or an egg. The body of the larva is first detached from it leaving on its internal parietes the external organs peculiar to it, such as the hooks of the mouth, &c. It soon assumes the form of a soft or gelatinous mass, on which none of the parts that characterize the perfect Insect can be seen. After the lapse of a few days, those organs become defined and the Insect is a true nymph. It extricates itself from confinement by separating the anterior extremity of its case which comes off like a cap.

The larvæ of the Diptera are destitute of feet, though appendages that resemble them are observable in some. This order of Insects is the only one in which we find larvæ with a soft and variable head. This character is almost exclusively peculiar to the larvæ of those which are metamorphosed under their skin. Their mouth is usually furnished with two hooks that enable them to stir up alimentary substances. The principal orifices of respiration, in most of the larvæ of the same order, are situated at the posterior extremity of their body. Several of them, besides, present two stigmata on the first ring, that which immediately follows the head or replaces it.

Messrs Fallen, Meigen, Wiedemann, and Macquart have lately rendered great service to this part of entomological science, both by establishing various new genera, by describing a vast number of new species, and by rectifying errors relative to several of those previously known. They have also employed the characters presented by the disposition of the nervures of the wings, to which I first resorted, with a corresponding nomenclature in my *Genera*. M. Macquart, in particular, has well described them, and his work on the Diptera of the north of France published in the Mem. de la Soc. des Sc. de l'Agricult. et des Arts, de Lille, of which he is one of the most distinguished members, surpasses, in my opinion, every thing hitherto published on this order of Insects.

We will divide the Diptera into two principal sections, which in various systems of the English savans, even form as many particular orders.

In those which compose the first, the head is always distinct from the thorax, the sucker is enclosed in a sheath, and the hooks of the tarsi are simple or dentated. The metamorphosis of the larvæ into nymphs is always effected after they have left the mother.

In the first subdivision we find Diptera whose antennæ are multi-articulated.

FAMILY I.

NEMOCERA.

In this family the antennæ usually consist of from fourteen to sixteen joints, and from six, or nine, to twelve, in the others. They are either filiform or setaceous, frequently hairy, particularly in the males, and much longer than the head. The body is elongated, the head small and rounded, the eyes large, the proboscis salient, and either short and terminated by two large lips or prolonged into a siphon-like rostrum, with two exterior palpi inserted at its base, usually filiform or setaceous and composed of four or five joints. The thorax is thick and elevated; the wings are oblong; the halteres are entirely exposed and apparently unaccompanied with alulæ. The abdomen is elongated, and most commonly formed of nine annuli; it terminates in a point in the female, but is thicker at the end and furnished with hooks in the males. The legs are very long and slender and are frequently used by these Insects to balance themselves. Several, particularly the smaller ones, collect in the air in numerous swarms, and as they flit about form a sort of dance. They are found at almost every season of the year. In coitu they are united end to end and frequently fly in that position. Some of the females commit their ova to the water; others deposit them in the earth or on plants.

The larvæ, always elongated and resembling worms, have a squamous head, always of the same shape, the mouth of which is furnished with parts analogous to maxillæ and lips. They always change their skin to become nymphs. The latter, sometimes naked, and sometimes enclosed in cocoons constructed by the larvæ, approximate in their figure to the perfect Insect, present their external organs, and complete their metamorphosis in the usual manner. They have frequently, near the head or on the thorax, two organs of respiration resembling tubes. This family is composed of the genera *Culex* and *Tipula* of Linnæus.

Some in which the antennæ are always filiform, as long as the thorax, densely pilose, and composed of fourteen joints, have a long, projecting, filiform proboscis, containing a piercing sucker consisting of five setæ(1). They constitute the genus

CULEX, Lin.—*Culicides*, Lat.

Or the Mosquetoes, where the body and legs are elongated and hairy; the antennæ densely pilose, the hairs forming tufts in the males; the eyes large and closely approximated or convergent at their posterior extremity; the palpi projecting, filiform, hairy, as long as the proboscis, and composed of five joints in the males, shorter and apparently with fewer articulations in the females. The proboscis is composed of a membranous, cylindrical tube, terminated by two lips forming a little button or inflation, and of a sucker consisting of five squamous threads which produces the effect of a sting. The wings are laid horizontally, one over the other, on the body, with little scales.

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(1) They have been well represented by Réaumur and Roffredi. The figure given by M. Robineau Desvoidy, in his Essai sur la tribu des Culicides—Mém. de la Soc. d'Hist. Nat., III, 390—conveys a wrong idea of the disposition of these setæ. This writer has promulgated an opinion relative to the correspondence of these parts with their sheath, almost diametrically the reverse of that which is generally received. Had he reflected that two of these setæ, in the Syrphi and other Diptera, are annexed to the palpi, he would not have taken them for mandibles, but considered them as analogous to jaws.

The torment we experience from these Insects, particularly in the vicinity of low grounds and water, where they are most abundant, is well known. Thirsting for our blood, they pursue us everywhere, penetrate into our dwellings, particularly in the evening, announce their presence by a peculiarly sharp hum, and pierce our skin with the fine setæ (dentated at the extremity) of their sucker; in proportion as they sink them into the flesh, the sheath bends towards the pectus and forms an elbow. They distil a venomous fluid into the wound, which is the cause of the irritation and swelling experienced from their attacks. It has been remarked that we are only persecuted by the females. In America, where they are known by the names of *Marangouins* and *Moustiques* or *Musquetoes*, the inhabitants, as in other countries, defend themselves from them by surrounding their beds with gauze or a Mosquetoe-bar. The Laplanders remove them by fire and rubbing the exposed parts of their body with grease. These Insects also feed on the nectar of flowers.

The female deposits her eggs on the surface of the water, and crossing her posterior legs near the anus, and slowly separating them as the ova are extruded, places them side by side in a perpendicular direction; the entire mass resembles a little bateau floating on that element. Each female lays about three hundred eggs in the course of the year. These Insects frequently survive the most intense cold. Their larvæ swarm in the green and stagnant waters of ponds and ditches, particularly in spring, the period at which those females lay their eggs who have passed through the winter. They suspend themselves on the surface of the water in order to respire, with their head downwards. They have a distinct rounded head, furnished with two (species of) antennæ and ciliated organs, by the motion of which they draw alimentary matters within their reach; a thorax with tufts of hairs; an almost cylindrical and elongated abdomen, much narrower than the anterior part of the body, divided into ten rings, of which the antepenultimate bears (above) the respiratory organ, and the last is terminated by radiating setæ and appendages. These larvæ are very lively, swim with considerable velocity, and dive from time to time but soon return to the surface. After some changes of tegument, they then become nymphs, which still continue to move by means of their tail and its two terminal fins. These nymphs also remain on the surface of the water, but in a different position from that of the larvæ, their respiratory organs being placed on the thorax; they consist of two tubular horns. It is in the water also that the perfect Insect is developed. Its exuviæ form a sort of board or resting place, which keeps it from submersion. All these metamorphoses occur in the space of three or four weeks, and several generations are produced in the course of the year.

In the excellent work of M. Meigen on the Diptera of Europe, the genus *Culex* of the preceding authors is divided into three. The species, in which the palpi of the males are longer than the proboscis, and those of the females are very short, form that of

CULEX proper.

C. pipiens, L.; De Geer, Insect., VI, xvii. Cinereous; abdomen annulated with brown; wings immaculate(1).

Those in which the palpi of the males are as long as the proboscis form another subgenus,

ANOPHELES(2).

Those in which they are very short in both sexes compose another, the

ÆDES, Hoff.(3)

M. Robineau Desvoidy, in his "Essai sur la tribu des Cuculides," has added three others.

The species in which the palpi (labial, according to his theory) are shorter than the proboscis, and where the intermediate tibiæ and tarsi are dilated and densely ciliated are designated collectively by the generic appellation of SABETHES(4). Those, in which the proboscis is elongated and recurved at the end, and where the palpi, also short, have the first joint thickest, the other shortest, and the three

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(1) For the other species, see Meigen, Dipt., I, 1; Macq., Dipt. du nord de la Fr., Tipulaires, p. 153.

(2) Ibid., I, 10; Macq., Ibid., 162.

(3) Ibid., I, 13.

(4) Mém. de la Soc. d'Hist. Nat. de Par., III, 411.

others cylindrical, form the genus Megarhinus(1). According to the same author, the *Culex ciliatus* of Fabricius should form another, his Psorophora(2). The ocelli are very distinct, and the legs of the female are ciliated; but the principal character consists in the presence of two little appendages situated on the prothorax, one on each side. They appeared to us to be formed by the dilatation of the lateral extremities of the segment. M. Desvoidy, in relation to this subject, quotes a similar observation made on a species of Psychoda by M. Leon Dufour, communicated to him by me. But he is mistaken in saying that it had never been published—we noticed it in the first edition of this work in the article *Rhipiptera*, and in that of *Psychoda*.

In the other Nemocera, the proboscis is either very short and terminated by two large lips, or in the form of a siphon or rostrum, but directed perpendicularly or curved on the pectus. The palpi are bent underneath, or turned up, but in that case, from one to two joints only.

Linnæus comprised them in his genus

Tipula.—*Tipulariæ*, Lat.

Which we will divide in the following manner.

We form a first section with those species in which the antennæ are evidently longer than the head, at least in the males, slender, filiform or setaceous, and composed of more than twelve joints in the greater number, and where the legs are long and slender.

Of these, some, always furnished with wings, never present ocelli. The palpi are always short. The head is not (or but very slightly) prolonged anteriorly. The wings are laid flat or tectiform, and have generally but few nervures that are longitudinal, divergent, and free posteriorly. The eyes are lunate, and the tibiæ without spines.

This subdivision consists of small species, which, while larvæ and nymphs, inhabit the water or vegetable galls.

Sometimes the antennæ are entirely covered with hairs, longest in the males, and forming a triangular tuft.

Most of their larvæ live in the water, and are allied to those of the Culices. Some have false feet. Others, besides, have appendages at the posterior extremity of their body, resembling strings or arms; Reaumur calls them *vers polypes*. Their usual colour is red. The nymphs inhabit the same element, and respire by means of two exterior tubes, situated at the anterior extremity of the body. Some of them possess the faculty of swimming.

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(1) Mém. de la Soc. d'Hist. Nat. de Par., III, 412.

(2) Ibid., 412.

These Insects are analogous to the Culices, and have been designated by authors under the name of *Tipulæ culiciformes*.

Those, in which the antennæ of both sexes consist of fourteen (somewhat) oval joints, the last differing but little from the preceding ones, and where the wings are laid horizontally one over the other, compose the subgenus

CORETHRA, Meig.

Tipula culiciformis, De Geer, Insect., VI, xxii, 10, 11. A brown body; legs and abdomen grey; nervures of the wings hairy(1).

Those, in which the wings are inclined, and the antennæ are formed of thirteen joints in the males and six in the females, furnished with short hairs, and the last, as in the preceding sex, very long, constitute the subgenus

CHIRONOMUS, Meig.

To which belongs the *Tipule annulaire* of the same author, Ibid., XIX, 14, 15, which is of a brownish-grey, with transverse black bands on the abdomen, and a black point on the wing(2).

TANYPUS, Meig.

Where the wings are also pendent; but the antennæ consist of fourteen joints in both sexes, the penultimate very long in the males; all the others, like those of the antennæ of the females, almost globular; the last somewhat thicker than the preceding ones. To this subgenus we refer the

Tipule bigarree, Id., Ib., XXIV, 19, which is cinereous; whitish, spotted with blackish; antennæ of the females terminating in a button. The larva of the latter sex has four false feet, two near the head, and the rest at the posterior extremity of the body(1).

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(1) For the other species, see Meigen on the Diptera, and Lat., Gen. Crust. et Insect., IV, p. 247, et seq.

(2) The same works, and Fab. Syst. Antl.

Sometimes the antennæ, always composed of at least thirteen joints in both sexes, and for the most part granose, are merely furnished with short setæ, or at most, and in the males only, with a bundle of hairs at base. They form our *Tipules gallicoles.*

CERATOPOGON, Meig.—*Ceratopogon, Culicoïdes,* Lat.

Where the antennæ are simply furnished with a bundle of hairs at base.

Their proboscis, as in the two following subgenera, resembles a pointed rostrum. The wings are incumbent. The larvæ live in vegetable galls(2).

PSYCHODA, Lat. Meig.

Without any tuft or bundle of hairs on the antennæ; wings tectiform and furnished with numerous nervures.

The front of the thorax, in one species of this subgenus, has two appendages which appear to us to be formed by the lateral extremities of its first segment(3).

CECIDOMYIA, Meig.

Where the antennæ, like those of the Psychodæ, are granose and simply furnished with short, verticillated hairs, but where the wings are incumbent on the body, and present but three nervures(4).

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(1) The same, and the Monograph of M. Fallen.

(2) Lat., and Meig., Ibid.

(3) Lat., and Meig., Ibid.

(4) Meig., Dipt., I, 93. See also the Jour. Ac. Nat. Sc. of Philad., Oct. 1817. M. Macquart—Dipt. du nord de la France—places his new genus LESTREMIA directly after Cecidomyia. The antennæ are hairy, curved forwards, not quite so long as the body, and composed of fifteen globular joints, pediculated in the males. The legs are long and slender, and the first joint of the tarsi is elongated. The *Cecidomyia destructor*, described and figured in the above journal, may very probably belong to this new subgenus, as the antennæ seem to indicate. The Macropezæ are also closely allied to these Diptera.

Other species, still of the same division with those in which the antennæ are slender and manifestly longer than the head, are also destitute of ocelli; but the eyes are entire, and oval or round. The wings, distant in several, always present membranous nervures united transversely, at least in part, and closed, discoidal cells. The anterior extremity of the head is narrowed and prolonged in the manner of a rostrum, and frequently exhibits a pointed projection underneath. The palpi are usually long. The extremity of the tibiæ is spinous.

Several of the larvæ live in mould, decomposed trees, &c. and have no distinct thorax nor false feet, but present two more apparent openings for respiration at the superior extremity of the body. The nymphs are naked, with two respiratory tubes near the head; the margin of the abdominal annuli is spinous.

This subdivision comprises the largest species of Tipulæ, those called *couturières*, *tailleurs*, &c., or our *Tipulaires terricoles.*

In several the wings are always extended, the antennæ of the males are usually bearded, pectinated or serrated; the palpi are composed of five joints, the last of which, extremely long, seems to consist of several smaller ones, or to be knotted. Such are the following subgenera.

Ctenophora, Meig.

Where the antennæ are filiform, pectinated in the males, granose or serrated in the females.

C. pectinicornis; Tipula pectinicornis, Fab. The abdomen fulvous, with black spots on the back, and yellow streaks on the sides; wings marked with a black spot(1).

Pedicia, Lat.

Where they are almost setaceous and simple, with the two first joints largest and elongated, the three following ones turbinated, the next three globular, and the seven last slender and almost cylindrical(2).

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(1) Lat., Gen. Crust. et Insect., IV, 254; Meig., Dipt., I, 155.

(2) Lat., Ibid. Meigen improperly unites them with the Limnobiæ. See Encyc. Méthod., article *Pédicie.*

TIPULA, Lat.

Where the antennæ are short, setaceous, and simple, but where all the joints, the second one excepted, which is almost globular, are nearly cylindrical; the first is the largest, the third elongated.

T. oleracea, L.; De Geer, Insect., VI, xvi, 12, 13. Antennæ simple; body greyish-brown and immaculate; wings light-brown, darker on the external margin. Very common in meadows on the grass. The larva feeds on the roots of decomposed plants(1).

NEPHROTOMA, Meig.

Where the antennæ are still simple and almost setaceous, with the first and third joints elongated and cylindrical, and the following ones arcuated; those of the males consist of eighteen, the females have but fifteen. This number is never exceeded in the preceding subgenera, even in the males(2).

PTYCHOPTERA, Meig.

Where those organs are always simple and nearly setaceous, consisting of sixteen joints, the third of which is much longer than the others, and the following ones oblong. The lips of the proboscis are inclined and very long(3).

In all the following subgenera the last joint of the palpi is hardly longer than the others, and presents no appearance of annular divisions. The wings are frequently incumbent, one on the other.

Here the antennæ have more than ten joints.

Those, in which they are mostly granose, of equal thickness, or hardly smaller at the extremity, and frequently furnished with whorls of hairs, according to Meigen, form various genera.

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(1) Lat., Ibid.; Meig., Ibid.

(2) Meig., Ibid.

(3) See Meig., Ibid.; Lat., Gen. Crust. et Insect., IV, 254.

Rhipidia, Meig.

The only Tipulariæ of this subdivision in which the antennæ of the males are pectinated(1).

Eriopteba, Meig.

Several nervures in the wings, as in those of the preceding Tipulæ, but covered with hairs(2).

Lasioptera, Meig.

Where the wings are also hairy, but present only two nervures(3).

Limnobia, Meig.

Where the wings are glabrous and the antennæ simple in both sexes(4).

The Polymera of M. Wiedemann—Dipt. Exot., p. 40—appear to be distinguished from the Limnobiæ by their antennæ which consist of twenty-eight joints, instead of from fifteen to seventeen.

In the other subgenera, the antennæ are terminated by several joints evidently more slender and almost cylindrical.

Trichocera, Meig.

The first joints of the antennæ almost bordering on an oval, the following ones more slender, long and pubescent.

The *Tipule d'hiver* of De Geer, which resembles a Culex, belongs to this subgenus(5).

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(1) Idem.
(2) Idem.
(3) Idem.
(4) Idem; but after removing the Pediciæ.
(5) See Meig., Ibid.

MACROPEZA, Meig.

The Macropezæ are distinguished by the extraordinary length of their posterior legs. Their antennæ, to a little more than half their length, are densely pilose(1).

DIXA, Meig.

The Dixæ are apparently closely allied to the Trichoceræ, but the first joint of their antennæ is very short, the second is almost globular, and the following ones are proportionally more slender. The last joint of the palpi is also more elongated than in Trichocera(2).

There the antennæ have but ten or six joints.

Those, in which they consist of ten, form the genus

MÆKISTOCERA, Wied.

Where the wings are distant(3).

Those in which they are composed of six form the

HEXATOMA, Lat.

Which will comprise the *Anisomeræ* and *Nematoceræ* of Meigen, which only differ from the Hexatomæ by the third joint of the antennæ being there longer than the second: in this respect it differs but slightly from the others(4).

Other Tipulariæ, analogous to the preceding ones in the absence of ocelli and the rounded figure of their eyes, exhibit a rare anomaly in this order of Insects: they are destitute of wings, and hence the origin of the term *Aptera*, which we apply to this subdivision. The antennæ are filiform, but somewhat more slender towards the extremity, and but slightly pilose. The legs are long, and the tibiæ unarmed. The abdomen of the females terminates in a point formed by a bivalve ovipositor.

This subdivision comprises the genus

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(1) Idem.

(2) Meig., Ibid., and Macq., Dipt. du nord de la France.

(3) Dipt. Exot., p. 41.

(4) Lat., Gen. Crust. et Insect., IV, 260; Meig., Ibid.

CHIONEA, Dalm.

C. araneoides. The only species known; it is found in winter, on snow and ice(1).

A second subgenus might be formed with the *Tipule atome* of De Geer—Mem. Ins., VIII, 602, XLIV, 27—which is always apterous, but whose antennæ have at least fifteen joints, whereas M. Dalman allows but ten to the preceding Insect. De Geer found this species running very rapidly across his table. They are both very small.

Another division of our Tipulariæ, that of the *Fungivora*, is distinguished from the preceding ones by the presence of two or three ocelli. The antennæ also are much longer than the head, slender, composed of fifteen or sixteen joints, a circumstance which removes these Insects from the succeeding division. The eyes are entire or emarginated. There is no division in the last joint of the palpi. The wings are always incumbent and horizontal on the body, and their nervures, longitudinal as well as transverse, are usually much less numerous than those of the preceding Tipulariæ. The legs are always long and slender, and the extremities of the tibiæ spinous.

In some the palpi are curved, and composed of at least four very apparent joints. The antennæ are filiform or setaceous.

Of these, some have the anterior extremity of the head prolonged into a rostrum or proboscis, and in those where this elytron is less considerable, the head is almost entirely occupied by the eyes. There are always three ocelli. The antennæ are short, and their joints but slightly elongated.

Those species, in which the eyes occupy almost the whole of the head, where the ocelli are of equal size and placed on a common eminence, and where the rostrum projects and is not longer than the head, form the subgenus

RHYPHUS, Lat.(2)

Those, in which the eyes only occupy the sides of the head, where the ocelli are not situated on a common tubercle, and where the anterior are smaller than the two posterior, and the rostrum is prolonged under the pectus in the manner of a proboscis, compose the subgenus

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(1) Dalm., Anal. Entom., p. 35.

(2) Lat., Gen. Crust. et Insect., IV, 251; Meig., Ibid.

ASINDULUM(1).

The subgenus

GNORISTA, Meig.,

Only appears to differ from Asindulum in the insertion of the palpi, which, according to his figures, is near the extremity of the proboscis, and not near its base. This remark was communicated to me by M. Carcel(2).

In no one of the following subgenera do we find the anterior part of the head projecting in the manner of a rostrum or proboscis. The eyes are always lateral.

Sometimes the antennæ, in the males at least, are longer than the thorax and setaceous, with the two first joints thickest. There are always three ocelli, the anterior or intermediate of which is the smallest.

BOLITOPHILA, Hoffm. Meig.

Where they are arranged in a transverse line.

M. Guerin has published a detailed description of a species of this subgenus in the Am. des Sc. Nat., X. Its larva lives in the mushroom(3).

MACROCERA, Meig.

Where the ocelli form a triangle(4).

Sometimes the antennæ, even of the males, are, at most, as long as the head and thorax.

Some subgenera in which the eyes are always entire are removed from the others by their four posterior tibiæ, all furnished exteriorly with small spines, as in

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(1) Lat., Ibid.; Meig., Ibid.
(2) Meig., Ibid.
(3) Meig., Ibid.
(4) Meig., Ibid.

MYCETOPHILA, Meig.,

Where there are but two ocelli, very small and distant(1), and in

LEIA, Meig.

Differing from Mycetophila in their three approximated ocelli, the anterior of which is the smallest(2).

SCIOPHILA, Meig.

The Sciophilæ have the joints of their antennæ less crowded, or more distinct than those of the Leiæ, and they are also hairy. Besides the closed cell which extends from the base to the middle, their wings present another complete cell which is small and corresponds to the first of those termed cubital in the Hymenoptera(3).

From the subgenera in which the outer margin of the tibiæ is destitute of spines, and where there are always three approximated ocelli, we will first separate those in which the antennæ are composed of sixteen joints.

Here the eyes are entire, and without any remarkable emargination(4).

PLATYURA, Meig.

To which he improperly unites the Ceraplatei. These Insects, in their wings and carriage, greatly resemble the Sciophilæ; but their first cubital cell is much larger; their antennæ seem to be proportionally thicker and more compressed than those of the last subgenera, and even slightly perfoliate. The abdomen of the females is widest near the end(5).

SYNAPHA, Meig.

Where the wings present but a single cubital cell closed by their posterior margin. The nervure in the middle, which traverses them longitudinally, bifurcates near the centre of their disk and forms a complete or closed oval cell. With the exception of their tibiæ, these Diptera are closely allied to the Leiæ(1).

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(1) Meig., Ibid.

(2) Lat., Meig., Macq., and the Encyo. Méthod.

(3) Meig., Ibid.

(4) Meig., Ibid., and Macq., Dipt. du nord de la France.

(5) Meig., Ibid. See Macq., Dipt. du nord de la France, *Tipulaires*, p. 45.

There, the eyes are evidently emarginated on the inner side.

MYCETOBIA, Meig.

Where the antennæ consist of sixteen joints, and the wings present a large closed cell extending from the base to the middle(2).

MOLOBRUS, Lat.—*Sciara*, Meig. Macq.

With similar antennæ, and where the middle of the wing presents a cell extending from the base to the posterior margin, and only closed by the latter(3).

CAMPYLOMYZA, Wied. Meig.

Where the antennæ consist of but fourteen joints, at least in the females, and also distinguished from the preceding by the wings, which are hairy and destitute of nervures at their internal margin The eyes are entire(4).

Our last Tipulariæ are fungivorous.

CEROPLATEUS, Bosc. Fab.

Where the palpi are turned up, appear to consist of but one joint, and are ovoid; the antennæ are fusiform and compressed(5).

Our last general division of the Tipulariæ, that which I call the *Florales*, is composed of species in which the antennæ, hardly longer than the head in both sexes, are generally thick, consist of from eight to twelve joints, in the form of a perfoliate club, nearly cylindrical in most of them, fusiform in some, and terminated in others by a thicker and ovoid joint. The body is short and thick. The head of the males is almost entirely occupied by the eyes. These Insects approach the fungivorous Tipulariæ in the nervures of their wings and the palpi. Such particularly are those which form the

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(1) Meig., Ibid.

(2) Meig., and Macq.

(3) Meig., and Macq. The only difference between this and the preceding subgenus appears to me to consist in the wings, and these characters are so slightly defined, that the two subgenera might be united. Olivier, in one of his first Memoirs on certain Insects which attack the cerealia, has described three species of Sciaræ and figured two.

(4) See Meigen.

(5) See Lat., Gen. Crust. et Insect., IV, 262. See also Fab., Meig., genus *Platyura*; Macq., and Dalm., Anal. Entom., 98.

CORDYLA, Meig.

Removed from all the following ones by their fusiform antennæ composed of twelve joints. The eyes are round, entire, distant, and the ocelli are wanting. Their legs are long, and their tibiæ spinous at the extremity(1).

We will now pass to subgenera in which the antennæ are composed of eleven joints, forming an almost cylindrical club. The eyes of the males are always very large and approximated or contiguous.

Here, as in the preceding subgenus, the head is destitute of ocelli; the eyes of the females are emarginated on the inner side in the form of a crescent.

SIMULIUM, Lat. Meig.—*Culex*, Lin.—*Rhagio*, Fab.

Where the antennæ are somewhat hooked at the end, and hence the name of *Atractocera* first given to this subgenus by Meigen. They are very small Insects, frequent low, wet woods, and annoy us by the severity of their bite. They sometimes penetrate into the genital organs of cattle and kill them. They, as well as the Culices, have been called *Musquetoes*(2).

There, the three ocelli are distinct.

One single subgenus approaches Simulium in the lunated eyes of the females, and is distinguished from all others of this division by its very small palpi that present but one distinct joint. It is the

SCATHOPSE, Geoff. Meig. Illig.

One species of this subgenus, the

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(1) Meig., Dipt, I, 274.
(2) Lat., Ibid.; Meig., and Fab.

S. latrinarum; *Tipula latrinarum*, De Geer, is very common in privies, particularly in autumn(1).

PENTHETRIA, Meig.

Where the eyes are entire and separated in both sexes. The legs are long and destitute of spines(2).

DILOPHUS, Meig.—*Hirtea*, Fab.

Formerly confounded with the Bibiones; the eyes are contiguous in the males and occupy nearly the whole head. A range of small spines crowns the extremity of their anterior tibiæ(3).

Finally, the last of the floral Tipulariæ have but eight or nine joints in their antennæ. Those species, in which they consist of nine, forming an almost cylindrical and perfoliate club, compose the subgenus

BIBIO, Geoff. Meig.—*Hirtea*, Fab.

The Bibiones are heavy Insects, fly but seldom and remain a long time in coitu. Some, very common in the gardens of France, have received names which indicate the time of their appearance; such are the *Mouches de St Marc*, *Mouches de St Jean*. The two sexes very often differ greatly as to colour, as is observed in the

B. hortulana; *Tipula hortulana*, L., the female; *F. marci*, L., the male; Geoff., Ins., II, xix, 3. The male is all black; the thorax of the female is a cherry-red, her abdomen yellowish-red, and the rest of her body black. Very common on flowers in the spring.

It is thought that these Insects gnaw the buds of plants. Their larvæ inhabit cowdung, earth, and dung-hills, and have little ranges of hairs on their annuli. Their pupæ are not enclosed in cocoons(4).

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(1) Lat., Meig., Fab.
(2) See Meig.
(3) Meig., Ibid.
(4) See Meigen.

ASPISTES, Hoff. Meig.

The only Insects of this division which have but eight joints in the antennæ, the last forming an ovoid club(1).

All the following Diptera, a small number excepted, have their antennæ composed of three joints, the first of which is so short, that it may be excluded from the supputation; the last is annulated transversely, but without distinct divisions. It is frequently accompanied with a seta, usually lateral, and situated on the summit in others, presenting two joints at base, sometimes simple, and sometimes silky. When this seta is terminal, it frequently happens that its length diminishes and its thickness increases, so that it has the form of a stilet. Although this piece may be considered as a continuation of the antennæ, yet as it is separated from them, and appears to constitute an appendage, to deviate from the course generally adopted, by adding to the ordinary number of the antennæ those of the seta, would only disturb the harmony of our nomenclature. The palpi never have more than two joints.

Some, a few excepted, whose larvæ divest themselves of their skin previous to becoming pupæ, always have a sucker composed of six or four pieces; the proboscis, or at least its extremity, that is to say, its lips, is always salient. The palpi, when they exist, are exterior, and inserted near the margin of the oval cavity, close to which arises the sucker.

The larvæ, even of those in which the skin forms a cocoon for the pupa (*Stratiomis*), retain their primitive form.

This subdivision will comprise three families.

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(1) Idem.

FAMILY II.

TANYSTOMA.

The Diptera of this family are distinguished from those of the two following ones by the last joint of the antennæ, which, exclusive of the seta which may terminate it, presents no transverse division; the sucker is composed of four pieces.

Their larvæ resemble long and almost cylindrical worms, with a constant and squamous head, always provided with hooks or retractile appendages, by which they are enabled to gnaw or suck the alimentary matters on which they feed. They change their skin to undergo their second metamorphosis. The nymphs are naked, and exhibit several of the external parts of the perfect Insect, which issues from its exuviæ, through a slit in the back.

In our first division we find species whose proboscis, always entirely (or nearly) salient, with the exterior envelope or the sheath of the sucker solid or almost corneous, projects more or less in the form of a tube or siphon, sometimes cylindrical or conical, and sometimes filiform, and terminates without any remarkable enlargement, the lips being small or confounded with the sheath. The palpi are small.

Some, that are rapacious, have an oblong body, the thorax narrowed before, and the wings incumbent, their proboscis is most commonly short or but slightly elongated, and forms a sort of rostrum. The antennæ are always approximated, and the palpi apparent.

ASILUS, Lin.

Where the proboscis is directed forwards.

They fly with a humming noise, are carnivorous, voracious, and according to their size and power, seize on Flies, Tipulæ, Bombi or

Coleopteræ, which they then exhaust by suction. Their larvæ have a small squamous head, armed with two movable hooks, live in the earth, and there become nymphs, whose thorax is furnished with dentated hooks, and the abdomen with small spines.

In some—*Asilici*, Lat.—the head is transverse; the eyes are lateral and distant, even in the males, and the proboscis is at least as long as the head. The wings have a complete cubital cell, forming an elongated triangle near the internal margin—the last of all—and terminating at the posterior edge. The epistoma is always bearded.

Sometimes the tarsi terminate by two hooks, with as many intermediate pellets.

Here, the terminal stilet of the antennæ is but slightly apparent, or when it is very distinct, its second and last joint is not prolonged in the form of a seta.

There are some of these in which the antennæ are hardly longer than the head; their stilet is barely visible or very short, conical and pointed; the part of the head from which they arise is not prominent, or but slightly so.

LAPHRIA, Meig. Fab.

Where the stilet of the last joint of the antennæ, which is either fusiform or resembles a small obtuse head, is not (or barely) visible, and where the proboscis is straight(1).

ANCILORHYNCHUS, Lat.

Where the stilet of the antennæ is hardly salient and pointed, and where the proboscis has the form of a compressed, arcuated, and hooked rostrum(2).

DASYPOGON, Meig. Fab.

Where that stilet is very distinct and conical, and the proboscis is straight(3).

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(1) See Lat., Gen. Crust. et Insect, IV, 298; Meig., Fab., Wied., and Macq.

(2) Two species collected by Count Dejean in Dalmatia, and another in the East Indies.

(3) See the authors already quoted.

In the two following subgenera the antennæ are manifestly longer than the head, and frequently placed on a common pedicle; the stilet is elongated and of the same thickness as the antennæ, at the end of which it forms two joints, the second longest, almost cylindrical or ovoid, and terminating in an obtuse point. In

CERATURGUS, Wied.

The antennæ are not implanted on a common tubercle, and their first joint is shorter than the second(1). In

DIOCTRIA, Meig. Fab.

These organs are situated on a common peduncle, and their first joint is longer than the following one(2).

There, the terminal stilet of the antennæ is prolonged in the form of a seta.

Those in which this seta is simple form the subgenus

ASILUS proper.

In Europe towards the close of summer we frequently find the

A. crabroniformis, L.; De Geer, Ins., VI, xiv, 3. It is about an inch long, and of an ochre-yellow; three first abdominal annuli of a velvet-black, the rest fulvous-yellow; wings russet. The metamorphosis of this species as well as that of the *A. forcipatus*, Lin., has been carefully observed(3).

Those, in which the seta of the antennæ is plumous, form the subgenus

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(1) Ibid., Anal. Entom., pl. i, 5.

(2) The same authors.

(3) For the other species and these various subgenera, see Latreille, Meigen, Fabricius, Wiedemann and Macquart. I presumed that the genus *Cyrtoma* of Meigen should not be arranged with the Platypezinæ, but with the Empides, according to the opinion of Fallen. M. Macquart has in fact lately referred them to the latter. This subgenus is distinguished from all those of this division, furnished like it with biarticulated antennæ, and in which the palpi are incumbent on the trunk, by the elongated and conical form of the last joint of the antennæ, by the wings, and by the smallness of the palpi. For other details, see Macquart's work, Dipt. du nord de la France.

Ommatius, Illig. Wied.(1)

Sometimes the tarsi are terminated by three hooks, the intermediate of which replaces the two pellets.

Gonypus, Lat.—*Leptogaster*, Meig.

The stilet terminates in a short seta. The abdomen is long and almost linear, and the tarsi are arcuated(2).

In the others, *Hybotini*, Lat., the head is more rounded, almost entirely occupied by the eyes, in the males, and its epistoma frequently naked, or but slightly pilose. The proboscis is very short. The wings present fewer nervures than those of the preceding ones, and their inner portion is destitute of that complete triangular cell, whose point rests upon the posterior margin, or at least it is merely rudimental.

Sometimes the last joint of the antennæ is large, fusiform, elongated, and terminated by a very small stilet.

Œdalea, Meig.

Sometimes the last joint is ovoid, short, or conical, and with a long seta(3).

Hybos, Meig. Fab.—*Damalis*, Fab.

Where the posterior thighs are large and inflated(4).

Ocydromia, Hoffm. Meig.

Where they are of an ordinary size(5).

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(1) Wied., Dipt. Exot., 213.

(2) See the authors just quoted.

(3) Idem. M. Macquart, Dipt. du nord de la France, has established two new genera in this division: Microphora, similar to Œdalea in the elongation of the third joint of the antennæ, but with an elongated stylet; and Leptopeza, closely allied to Ocydromia, but with the stilet entirely terminal, whilst in the latter it is inserted in the back of the third joint, a little beneath its extremity.

(4) See the same works.

(5) Idem.

EMPIS, Lin.—*Empides*, Lat.

Closely allied to Asilus in the form of the body and the position of the wings, but with the proboscis perpendicular or directed backwards. The head is rounded and almost globular; the eyes very large.

These Insects are small and live on prey and the nectar of flowers. The last joint of their antennæ is always terminated by a biarticulated or short stilet, or by a seta. The males of some species—*Hilariæ*—have the first joint of the anterior tarsi strongly dilated.

Some have triarticulated antennæ.

Sometimes the last joint forms an elongated cone.

Here the proboscis is much longer than the head; the biarticulated stilet terminating the antennæ is always short. The palpi are always turned up.

EMPIS, proper.

Such in Europe is the

E. pennipes, Fab.; Panz., Faun. Ins., LXXIV, 18. Black, with obscure wings; posterior legs of the female furnished with hairs resembling feathers.

RAMPHOMYIA, Meig.

Only differing from Empis by the absence of a little transverse nervure in the end of the wing(1).

There, the proboscis is hardly longer than the head.

HILARIA, Meig.

Where the antennæ are terminated by a little biarticulated stilet(2).

BRACHYSTOMA, Meig.

Where the stilet is extended into a long seta(3).

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(1) See Lat., Meig., Fab.; Macq., F. II.

(2) Meig., Macq.

(3) Meigen.

Sometimes the last joint, also terminated by a seta, forms, with the preceding one, a spherical body, as in ,

GLOMA, Meig.

Where the proboscis is also very short(1).

The others present distinctly but two joints in their antennæ. The last is ovoid or almost globular, and terminated by a seta, forming, as in the preceding Insects, the second joint of the stilet. The proboscis is generally short, and the palpi are incumbent on it.

HEMERODROMIA, Hoffm. Meig.

Remarkable for the length of the coxæ of the two anterior legs(2).

SICUS, Lat.—*Tachydromia*, Meig.

Distinguished by the inflation of the thighs of the first or second pair of legs(3).

DRAPETIS, Meig.

Where the last joint of the antennæ is almost globular and the proboscis scarcely salient(4).

M. Macquart, by applying the method of Jurine to the Diptera, and paying more attention to other parts, has established several new subgenera which our limits prevent us from describing(5).

The remaining Tanystomæ of our first division usually have a short, wide body, the head applied directly to the thorax, the wings distant and the abdomen triangular. In a word, their general appearance is that of our domestic Fly. Their proboscis is frequently long.

CYRTUS, Lat.

Intermediate between Empis and Bombylius. The wings are inclined on each side of the body; and the alulæ very large and covering the halteres; the head is small and globular, the thorax very high or gibbous, the abdomen vesicular and rounded, or almost cubical; the antennæ are closely approximated, and the proboscis is directed backwards or wanting.

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(1) Idem.
(2) Meig. and Macq.
(3) Idem.
(4) Meig.
(5) Macq.

Those which have the proboscis prolonged backwards form two subgenera. In the first,

CYRTUS, Lat.

Or Cyrtus properly so called, the antennæ are very small and consist of two joints, the last with a terminal seta. In the second, or

PANOPS, Lam.

The antennæ are longer than the head, almost cylindrical, triarticulated and without a terminal seta.

In the remaining Cyrti the proboscis is not remarkable.

ASTOMELLA, Dufour.

Distinguished by the antennæ, composed of three joints, the last of which forms an elongated and compressed button without a seta.

HENOPS, Illig.—*Ogcodes*, Lat.

The antennæ very small, biarticulated, with a terminal seta and inserted in front of the head.

ACROCERA, Meig.

Similar antennæ inserted on the anterior part of the head(1).

BOMBYLIUS, Lin.—*Bombyliers*, Lat.

Where the wings are extended horizontally on each side of the body, and the halteres are exposed. The thorax is higher than the head, or gibbous as in Cyrtus; the antennæ are closely approximated, and the abdomen is triangular or conical; the proboscis is directed forwards.

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(1) See Lam., Ann. du Mus. d'Hist. Nat., III, p. 263, xxii, 3; Lat., Gen. Crust. et Insect., IV, p. 315, et seq.; the Encyc. Méthod., articles *Ogcodes* and *Panops;* Meigen and Fabricius. For the genus *Astomella*, see the Dict. Class. d'Hist. Nat.

Their antennæ always consist of three joints, the last elongated, almost fusiform and compressed, truncated or obtuse, usually terminated by a very short stilet, and never by an elongated seta. The palpi are small, slender and filiform. The proboscis is generally very long and most slender at the extremity. Their legs are long and attenuated. They fly with great velocity, hover over flowers without alighting on them, introduce their trunk into their calyx to obtain their nectar, and produce a sharp humming sound. I suspect that their larvæ are parasitical as well as those of the following genus.

In some the proboscis is evidently longer than the head, very slender and tapers to a point.

Toxophora, Meig.

Removed from all the others by the antennæ, which are as long as the head and thorax, projecting, filiform, and terminating in a point, and of which the first joint is much longer than the rest. The body is elongated(1).

Of those in which the antennæ are much shorter, the

Xestomyza, Wied.

Approximates to Toxophora in the length of the first joint of those organs, which is considerably greater than that of the others; it is almost fusiform, as well as the third or last(2).

Apatomyza, Wied.

Is another subgenus in which the first joint of the antennæ is also very long; but here that joint is cylindrical(3).

In the following subgenera of the same division, or of those whose proboscis is long and setaceous, or filiform, the last is the longest.

Sometimes the two first joints of the antennæ are short and almost of equal length.

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(1) See Meigen; his *T. maculatus* had been described and figured by Villers, in his Entom. d'Europ., III, x, 31. *Asilus fasciculatus*. See also Wied., Dipt. Exot.

(2) Wied., Dipt., Exot., 153, I, 11.

(3) Id., Ibid., III. I have never seen a species of this genus.

LASIUS, Wied.

Where the head, in one of the sexes, is almost entirely occupied by the eyes, and the last joint of the antennæ is very long, almost linear, compressed, and without any apparent terminal seta. The abdomen is voluminous. The labrum is large, gibbous at base, and truncated at the end.

In one specimen, for which I am indebted to the kindness of M. de Lacordaire, the proboscis extends along the under part of the body and projects beyond its posterior extremity. This character, with some others, would seem to indicate that this subgenus naturally belongs to the tribe of the Vesicularia, and comes near Panops(1).

USIA, Lat.—*Volucella*, Fab.

Where the last joint of the antennæ is ovoido-conical, obtuse or truncated at the end, and terminated by a stilet. The palpi are not apparent.

The species are peculiar to the southern countries of Europe and to Africa(2).

PHTHIRIA, Meig.

Similar to Usia in the antennæ, but the palpi are distinct(3).

Sometimes the second joint is evidently shorter than the first; the last is long, generally almost cylindrical, and terminated in a point, as in

BOMBYLIUS, proper.

Where the palpi are very apparent.

These Insects are densely covered with a woolly down, which colours it. The most common species in the environs of Paris is the

B. major, L.; *B. bichon*, De Geer, Insect., VI, xv, 10, 11. From four to five lines in length, and entirely covered with yellowish-grey hairs; proboscis long and black; external half of the wings blackish, the remainder diaphanous; legs fulvous.

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(1) Wied., Anal. Entom., I, 3.

(2) Lat. Gener. Crust. et Insect., IV, 314. See also Fab., and Meig.

(3) The same works.

Geoffroy has confounded the above genus with Asilus(1).

Geron, Meig.

This genus appears to be distinguished from Bombylius only by the more remarkable elongation of the last joint of the antennæ and its subulate termination, and by the wings which have one transverse nervure less near the posterior margin, so that the number of the closed cells of that margin is less(2).

The genus *Thlipsormyza* of Wiedemann—Dipt. Exot., I, iv—appears to approximate to the preceding Insects and to Phthiria. That called *Amictus* I presume also approaches them; in both the first joint of the antennæ is longer than the second, and cylindrical, a character which approximates them to Geron. The wings in *Amictus*, however, are somewhat different from those of the preceding genera.

In the other species the proboscis is, at most, as long as the head, and inflated at the end; the first joint of their antennæ is the largest of all. Those, in which it is much larger than in the following ones, form the genus

Ploas, *Conophorus*, Meig.(3)

And those in which it is simply larger, without any remarkable increase of thickness, the

Cyllenia(4).

Where the abdomen is more elongated and almost conical.'

Anthrax, Scop. Fab.—*Musca*, Lin.—*Anthracii*, Lat.

Similar to Bombylius; but where the body is depressed, or but slightly elevated and not gibbous, with the head as high and as broad as itself. The antennæ are always short, and, in the Stygides alone excepted, distinct from each other, and always terminated by a subulate or punch-like joint. The proboscis, except in a small number, is generally short, extending but little beyond the head, frequently even withdrawn into its oral cavity, and terminated by a little inflation formed by the lips. The palpi are usually concealed, small, filiform, and each, at least in several, adhering to one of the threads of the sucker. The abdomen is less triangular than that of the Bombylii, and partly square. These Insects are generally hairy. Their habits are very analogous to those last mentioned. They frequently alight on the ground, on walls exposed to the sun, and on leaves.

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(1) Ibid., Latreille, Meigen, Fabricius, Macquart and Olivier, article *Bombille*. The genera *Corsomyza* and *Tomomyza* of Wiedeman—Dipt. Exot.—are unknown to me. In the first, the last joint of the antennæ is twice the length of the preceding ones, and compressed and dilated at the end. The second appears to approach Cyllenia and Mulion.

(2) See Meigen.

(3) Lat. Gener., IV, 312; Fab., Meig., Macq.

(4) Lat., Ibid., and Meig.

Some approximate to the Bombylii in their antennæ, which are closely approximated at base. Their proboscis projects but very little beyond the oral cavity, as in

STYGIDES, Lat.—*Stygia*, Meig.(1)

In the others the antennæ are distant.

Here, the head is almost globular; the proboscis is never long; the palpi are always concealed, and the extremity of the wings does not exhibit numerous areolæ forming a network.

ANTHRAX, Meig.

Or Anthrax properly so called, where the three ocelli are closely approximated.

A. morio; Musca morio; Panz., Faun. Ins. Germ., xxxiii, 18; *A. semiatra*, Meig. Entirely black, with russet hairs on the thorax and sides of the abdomen. The wings, from their base to a little beyond the half of their length, are black, which colour, in terminating, forms four almost equal dentations. It is one of the most common species in the environs of Paris(2).

HIRMONEURA, Wied. Meig.

Where one of the three ocelli, the anterior, is distant from the two others which are posterior; the proboscis is concealed. The wings exhibit more nervures than those of the preceding subgenus(1).

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(1) See Meigen and Macquart. The name of *Stygia* had already been appropriated to a genus of the Lepidoptera.

(2) This subgenus is designated in the Encyc. Method., X, 676, by the name of *Lomatia*.

There, the head is proportionally shorter, almost hemispherical, and compressed transversely; the antennæ are very distant; the trunk is longer than the head; the palpi are sometimes exterior, and the extremity of the wings frequently exhibits a reticulation analogous to that of the same organs in the Neuroptera.

Those, in which they are always reticulated in the usual manner, where the proboscis is merely a little longer than the head, and the palpi are not apparent, where the first joint of the antennæ is cylindrical, somewhat longer than the preceding one, and the last forms an elongated cone, compose the subgenus

Mulio, Lat. Meig.—*Cytherea*, Fab.(2)

Those, in which the summit of the wings is most frequently reticulated like those of the Neuroptera, and the proboscis is much longer than the head, with the palpi external, in which the two first joints of the antennæ are very short, nearly equal in size, almost granose, and the last forming a very short cone, with an abrupt and almost setaceous stilet at the extremity, constitute the subgenus

Nemestrina, Lat. Oliv. Wied.

Where the tarsi are furnished with three pellets, whilst in the preceding subgenera there are only two, and frequently but slightly apparent(3).

> Two species, one of which—*Cytherea fasciata*, Fab.—is found in Italy and in ci-devant Provence, differ but little as to the reticulation of their wings from the Anthraces. They form the genus Fallenia of MM. Meigen and Wiedemann. According to them, the proboscis is susceptible of being curved beneath and along the pectus(4).

The genus Colax of Wiedemann—Anal. Entom., xviii, fig. 8—in general appearance, antennæ and wings, appears to us to approximate to the last mentioned Anthraces, but according to that gentleman the oral cavity is closed as in Œstrus, and the ocelli are wanting.

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(1) See Meigen.

(2) Lat., Meig., Fab., Wied.

(3) The Hirmoneuræ should be excepted, according to a figure of one of the tarsi given by Meigen.

(4) See the authors already quoted, and the Encyc. Méthod., article *Némestrine.*

Our second general division of the Tanystoma is characterized by a membranous proboscis, usually with a short stem, projecting but slightly and terminated by two very distinct and raised or ascending lips.

The form of the head in the larvæ of the last Diptera of this division is variable.

In some—*Leptides*—the wings are distant and exhibit several complete cells. The antennæ are not terminated en palette. The palpi are filiform or conical.

Sometimes these palpi are withdrawn into the oral cavity. The antennæ have a fusiform termination or one resembling an elongated cone, with a little articulated stilet at the end(1).

THEREVA, Lat. Meig.—*Bibio*, Fab.

To which belongs the following species.

T. plebeia; *Bibio plebeia*, Fab. Black, with cinereous hairs; abdominal annuli margined with white. On plants.

The larva of a species of this genus—*Nemotelus hirtus*, De Geer—lives in the ground and resembles a little serpent. Its body is white and pointed at both ends. It changes the whole of its skin when about to become a pupa(2).

Sometimes the palpi are exterior. The last joint of the antennæ is either almost globular or reniform, or nearly ovoid or conical and terminated by a long seta.

The tarsi are furnished with three pellets. They form the genus

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(1) This subdivision corresponds to the family of the *Xylotoma* of Messrs Meigen and Macquart.

(2) Lat., Ibid., Fab., Meig. and Macquart. In the collection of Faujas, I saw a piece of schist that exhibited the impression of a species of this genus.

LEPTIS.

Which is divided into several subgenera.

ATHERIX, Meig. Fab.

Where the first joint of the antennæ, larger than the second, is thick at least in one of the sexes, and the third is lenticular and transversal.

The palpi project(1).

LEPTIS, Fab. Meig.—olim *Rhagio*, Fab.

Where the last joint of the antennæ is almost globular or ovoid, always terminated in a point, and never transversal.

In some, the antennæ are shorter than the head, and their three joints are nearly of equal length.

Here, the palpi project.

Such are the *Leptis*, Macq., where the third joint of the antennæ is ovoid or pyriform.

L. scolopacea; *Musca scolopacea*, L.; *Némotèle becasse*, De Geer, Insect., VI, ix, 6. Thorax black; abdomen fulvous, with a range of black spots on the back; legs yellow; wings maculated with brown. Very common in woods.

There, the palpi are raised vertically, forming the *Chrysophilus* of that naturalist, and united to *Atherix* by Fabricius.

In the others, the antennæ are as long as the head, the first joint elongated and cylindrical, the second short, and the third conical; the palpi are turned up. The posterior thicker than in the preceding subgenera. The abdomen is linear.

L. vermileo; *Musca vermileo*, L.; *Némotèle ver-lion*, De Geer, Ibid., x. Resembling a Tipula; yellow; four black streaks on the thorax; the abdomen elongated, with five ranges of black spots; wings immaculate.

The larva is almost cylindrical; its anterior portion is much the smallest, and there are four mandibles on the opposite extremity. It resembles a stick-like geometra (caterpillar), and is equally rigid when withdrawn from its domicil. It bends its body in every direction, advances and moves about in the sand, and excavates there an infundibuliform cavity, at the bottom of which it secretes itself either entirely or partially. If an Insect be precipitated into the trap it rises suddenly, clasps it with its body, pierces it with the stings or hooks of its head, and sucks it. It flings away the carcass as well as the sand, by bending its body, and then suddenly relaxing it, like a bow.

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(1) See the works just quoted.

The pupa is covered with a layer of sand.

M. de Romand, paymaster-general at Tours, who makes a particular study of the Insects in his vicinity, has again observed the metamorphoses of this Insect, and sent me several living larvæ, some of which I preserved in that state for three years(1).

The Clinoceræ—Clinocera—of Meigen, by their wings, seem to belong to the following division.

The other Tanystoma of our second division have their wings incumbent on the body, and exhibit at most but two complete or closed cells. The antennæ terminate in a palette, almost always accompanied by a seta(2). The palpi of the greater number are flattened or laminiform, and laid on the proboscis.

These characters, a body compressed on the sides, a triangular head, slightly projecting in the manner of a snout, the abdomen curved underneath, and long slender legs furnished with little spines, particularly distinguish the genus

Dolichopus, Lat. Fab.

Which now forms a small tribe—Dolichopodes—arranged by M. Macquart, in a very natural order, which we adopt, with the exception of one alteration, which will place Dolichopus proper and Ortochile, with which he finishes, at the beginning.

The male organs of generation, in some, present laminiform appendages.

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(1) For the other species, see Fabricius, Meigen and Macquart.

(2) In several, the last joint of the antennæ differs but little from that of the preceding Diptera, but the relative position of their wings and their reticulation present distinctive characters.

Here the proboscis is elongated, and forms a little rostrum.

ORTOCHILE, Lat. Meig. Macq.(1)

There, as in all the other Dolichopi, the proboscis is very short, or almost non-salient.

DOLICHOPUS proper.

Where the third joint of the antennæ is almost triangular, but slightly elongated, with a seta of moderate length, uninflated and in the form of a joint between its middle and extremity.

These Insects are frequently green or cupreous. The legs are long and very slender. They are found on walls, trunks of trees, &c. Some of them run along the surface of the water with great celerity. The sexual organs of the male are almost always external, large, complex, and folded up under the venter.

D. ungulatus, Fab.; *Némotèle bronzée*, De Geer, Insect., VI, xi, 19, 20. Antennæ but half the length of the head; body bronze-green, glossy; eyes golden; legs pale yellow; wings immaculate.

Its larva lives in the ground; it is long, cylindrical, and furnished with two points in the form of recurved hooks. On the front of the thorax of the nymph are two long horns directed forwards, and bent into the figure of an S(2).

SYBISTROMA, Meig.

Where the last joint of the antennæ is almost in the form of the blade of a knife, with a very long seta, inflated like a knot, anterior to its extremity(3).

The male organs of generation in the others are furnished with filiform appendages.

Here, the third joint of the antennæ either borders on an oval or is triangular, or is very long and narrow, and almost lanceolate, as in

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(1) Lat., Gen. Crust. et Insect., IV, 289. See also Meigen and Macquart.

(2) For the remaining species, and some others of the following subgenera, see a Memoir of the Baron Cuvier, in the Journ. d'Hist. Nat. et de Phys., II, p. 253. See also Meigen and Macquart.

(3) Meig., and Macquart.

RAPHIUM, Meig.(1)

In the following, or

PORPHYROPS, Meig.(2)

It is securiform or triangular, and with a hairy seta; the first joint is very short or indistinct. In

MEDETERUS, Fisc. Meig.

This seta is simple, with the first joint distinct and elongated. The last joint of the antennæ, or the palette, is nearly oval.

M. Macquart has formed a genus—*Hydrophorus*—with those species in which the seta is altogether terminal. Those in which the insertion is dorsal alone compose the genus Medeterus(3).

There, the third joint of the antennæ is almost globular. The seta is always hairy. If it be terminal, we have the genus CHRYSOTUS; if it be inserted a little underneath, that of PSILOPUS; and finally, if it arise lower down or near the base, DIAPHORUS, which genus, by the almost spherical head, nearly entirely occupied by the eyes, in the males, appears to us to lead to the family of the *Platypezina* of Meigen. The wings, ocelli, and some other characters drawn from the parts of the head, confirm those we have described. We cannot, however, enter into similar details here(4).

The Platypezina of M. Meigen, from which Macquart has very properly removed the genus *Cyrtoma*, and to which we unite that of *Scenopina* and his family of the MEGACEPHALI(5), consist of Diptera very analogous in their proboscis, antennæ and wings to the Dolichopi; but the body is depressed, the head hemispherical and almost entirely occupied by the eyes, at least in the males. The palpi are turned up or withdrawn, cylindrical or clavate, and resembles those of the Notocanthi. The legs are short and spineless, and the posterior tarsi frequently broad and flattened.

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(1) Idem.

(2) Idem.

(3) Idem.

(4) Meig., and Macquart. The genus *Lonchoptera*, arranged by Meigen with the preceding genera, is greatly removed from them. See the tribe of the *Muscides*.

(5) We form them into a small tribe under the denomination of CEPHALOPSIDES.

These Diptera are very small. M. Macquart has furnished us with various interesting observations on the habits of several species.

Some have a seta on the last joint of the antennæ.

Those, in which that seta is terminal, whose eyes are contiguous in the males, and the three first joints of whose posterior tarsi, or the first at least, are wide and flattened, form the subgenera

CALLOMYIA, Meig.

Where the first joint alone of the posterior tarsi is dilated, but is as long as all the others taken together.

PLATYPEZA, Meig.

Where the four first joints of the posterior tarsi are dilated.

Those, in which the seta is inserted on the back of that joint, near its junction with the preceding one, whose tarsi are not dilated, and whose eyes are separated in both sexes, compose the genus

PIPUNCULUS, Lat.—*Cephalops*, Fallen.

Where the head is almost globular.

The others have no seta on the last joint of the antennæ. It is narrower and longer than in the preceding Insects.

SCENOPINUS, Lat. Meig.—*Musca*, Lin.

To which belongs the following species.

S. fenestralis; Musca fenestralis, L.; Schell., Dipt. XIII, 1, the female; 2, the male. Head and thorax obscure bronze; abdomen black, transversely striate, streaked with white in the male; legs fulvous; tarsi obscure. Very common on the glass in windows(1).

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(1) For all these subgenera, see the authors already quoted.

FAMILY III.

TABANIDES.

Our second family of the Diptera is characterized by a salient proboscis, usually terminated by two lips with projecting palpi, by the last joint of the antennæ being annulated, and by a sucker composed of six pieces: it comprises the genus

TABANUS, Lin.(1)

These Diptera are very similar to large Flies, and well known by the torment they occasion to cattle, by piercing their skin in order to suck their blood. Their body is usually but slightly pilose. Their head is as wide as the thorax, almost hemispherical, and with the exception of a small space, particularly in the males, occupied by two eyes, generally of a golden-green, with purple spots or streaks. Their antennæ are about the length of the head, and are composed of three joints, the last of which is the longest, terminates in a point, has neither seta nor stilet at the end, is frequently lunate above its base, and with from three to seven transverse and superficial divisions. The proboscis of the greater number is almost membranous, perpendicular, of the length of the head or somewhat shorter, almost cylindrical, and terminated by two elongated lips. The two palpi, usually incumbent on it, are thick, pilose, conical, compressed and biarticulated. The sucker inclosed in the proboscis is composed of six small pieces, in the form of lancets, which, by their number and relative situation, correspond to the parts of the mouth in the

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(1) This family is not connected with the preceding one. It appears to me to form a particular series with the following, leading from the Nemoceræ to the Atericeræ. The preceding family would form another which would also lead to them, so that the last of this one would be approximated to the last of the Notacanthi. The Culicides and Tabanides are the only Diptera whose sucker is composed of six pieces.

Coleoptera. The wings are extended horizontally on each side of the body. The alulæ almost completely cover the halteres. The abdomen is triangular and depressed. The tarsi are furnished with three pellets.

These Insects begin to appear towards the close of spring, are very common in the woods and pastures, and produce a humming noise when on the wing. They even pursue Man in order to suck his blood. Beasts of burden, having no means of repulsing them, are most exposed to their attacks, and are sometimes seen covered with blood from the wounds they inflict. The Insect mentioned by Bruce, under the name of *Tsaltsalya*, which is dreaded even by the Lion, may possibly belong to this genus.

In some, the proboscis is much longer than the head, slender, siphoniform, squamous, and usually terminated in a point, with the palpi very short in proportion to its length. The last joint of the antennæ is divided into eight annuli. They form the subgenus

PANGONIA, Lat. Fab.—*Tanyglossa*, Meig.

These Insects are only found in hot climates, and feed on the nectar of flowers like the Bombylii(1).

In the others the proboscis is shorter, or hardly longer than the head, membranous, and terminated by two large lips; the length of the palpi is at least equal to half that of the proboscis, and the last joint of the antennæ is divided into five or four rings.

Sometimes the antennæ are hardly longer than the head; the last joint which is somewhat lunate and subulate is divided into five rings, the first very large with a tooth superiorly. They constitute the subgenus

TABANUS proper.

To which belongs that well known species,

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(1) Encyc. Méthod., article *Pangonie*. See also Meigen and Wiedemann.

Some species are destitute of ocelli, and form the genus PHILOLICHE of Count Hoffmansegg, Wied., Dipt., Exot., 54. Others in which the proboscis projects, as in Pangonia, but ascends, where the palpi consist of three joints instead of two, and the antennæ resemble those of Tabanus proper, compose the genus RHINOMYIA, Wied., Ib., 69.

Those, which he calls RAPHIORHYNCHUS and ACANTHOMERA placed by him be-

T. bovinus, L.; De Geer, Insect., VI, xii, 10, 11. An inch long; body brown above, grey beneath; eyes green; tibiæ yellow; transverse lines and triangular spots of pale yellow on the abdomen; wings transparent, with russet-brown nervures.

The larva lives in the ground. It is elongated, cylindrical, and attenuated towards the head, which is armed with two hooks. The annuli of the body (twelve) are marked with raised cords. The nymph is naked, almost cylindrical, with two tubercles on the front, cilia on the margin of the annuli, and six points at the posterior extremity. It ascends to the surface of the soil when about to divest itself of its skin, in order to assume the form of a Tabanus, and protrudes the half of its body above it. Very common near Paris.

T. maroccanus, Fab. Black, with golden-yellow spots on the abdomen.—The scourge of Camels, which, according to M. Desfontaines, are sometimes completely covered with these Insects(1).

Sometimes the antennæ are very evidently longer than the head and terminated by a joint forming an elongated cone, or almost cylindrical, frequently presenting but four rings. The ocelli are wanting in several.

Some, in which the last joint of the antennæ is always subulate and divided into five rings, have three ocelli.

Those, in which the first joint is manifestly longer than the following one, and cylindrical; and where the latter is very short, and resembles a cup, form the subgenus

SYLVIUS, Meig. (2)

Those, in which the two first joints are cylindrical, and almost equal in size, compose the subgenus.

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tween the preceding genus and Tabanus, according to our method, belong to the family of the Notacanthi.

(1) For the remaining species of this subgenus, see Lat., Fab., Meig., Palis de Beauv., Macq., Fallen and Wiedemann.

(2) See Meigen. He quotes but a single species, the *Tabanus vituli*, Fab., and to which he refers his *T. italicus*.

Chrysops, Meig.

To which belongs the

C. cæcutiens, Fab.; De Geer, Insect., VI, xiii, 3, 5. Eyes golden, with purple points; thorax yellowish-grey, streaked with black; abdomen yellowish above, with a broad black spot, forked at the end, on the two first annuli; two others, elongated, and of the same colour on each of the following ones, and three blackish-brown and transversal ones on the wings. They are constantly persecuting the Horse(1).

The others are destitute of ocelli; the last joint of their antennæ, sometimes cylindrical, presents but four rings.

Here, as in

Hæmatopota, Meig.

It is subulate, and the first is thick, and almost borders on an oval in the males(2).

There, as in

Hexatoma, olim *Heptatoma*, Meig.

The antennæ, longer than in the preceding ones, are cylindrical; the last joint is much elongated(3).

FAMILY IV.

NOTACANTHA.

The fourth family of the Diptera, as well as the preceding one, presents antennæ of which the third and last joint is divided transversely in the manner of a ring, or which are even composed of five very distinct joints; but the sucker is formed of only four pieces, and the proboscis, the stem of which is usually very short, is almost entirely retracted within the oral cavity. The membranous nature of that organ and its turned up lips, its similarly raised and clavate palpi, the relative disposition of the wings which are usually crossed, the form of the abdomen which is rather oval or orbicular than triangular, and finally the scutellum which is frequently armed with teeth or spines, also distinguish the Notacantha from the Tabanides.

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(1) See Fab., Lat., Meig., Fall., Wied., Macq., &c.

(2) The same authors.

(3) Idem.

But few of their larvæ have been observed. Such as have been discovered, are described and figured by Swammerdam, Réaumur and Rœsel, are aquatic, and approximate to those of the Athericera in their soft head, varying in form, and in their habit of becoming pupæ under their own skin; but they retain their primitive form and proportions, thus differing from those of the latter.

Other larvæ of the Notacantha—*Xylophagus*—live in the carious and diseased parts of trees.

We divide the Notacantha into three principal sections.

Those of the first—*Mydasii*, Lat.—never have teeth or spines in the scutellum. Their body is oblong, and the abdomen forms an elongated and conical triangle. The wings are distant. Their antennæ, from which we draw their most distinguishing character, are sometimes composed of five distinct joints, the two last of which form a club in some, and the extremity of a cylindrical stem with a subulate termination in others, and sometimes of three joints, the last of which is largest, almost cylindrical, tapers to a point and is divided into three annuli; thus these organs are always divided into five. With the exception of Mydas in which the vestige of a very small stilet is perceptible, neither that appendage nor the seta which replaces it can be found in any of the Notacantha of this section; it is possible that the two last joints may represent them.

In some the antennæ are much longer than the head, consist of five joints, are terminated in an elongated club formed by the two last, with an umbilicus at the end from which issues a very short seta. The posterior thighs are stout, and dentated or spinous on the inner side. The tarsi have but two pellets. The posterior cells of the wings are complete or closed before the margin, and narrow or elongated, oblique or transverse.

These Insects compose the genus

MYDAS,

Which is divided into two subgenera.

CEPHALOCERA, Lat.

Where the proboscis is in the form of a long and projecting siphon(1).

MYDAS, Fab.

Or Mydas proper, where that organ, as is usual in this family, terminates by two large lips(2).

In the others, the antennæ are scarcely longer than the head, cylindrical, and tapering to a point at their extremity. The tarsi are furnished with three pellets. The posterior cells of the wings are longitudinal and closed by their posterior margin.

CHIROMYZA, Wied.

Where the antennæ are composed of five well separated joints, the two last of which are the smallest(3).

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(1) A subgenus established on an Insect from the Cape.

(2) See Fab., Lat., and particularly Dalm., Dipt. Exot., 115, who describes several species. This subgenus and the preceding one appear to form a particular division, which, in a natural order, should perhaps be placed higher. The wings have some affinity with those of the Pangoniæ.

(3) Wied., Dipt., Exot., I, viii.

PACHYSTOMUS, Lat.

Where the antennæ are composed of three joints, the last of which is divided into as many rings(1).

In the second section, that of the *Decatoma,* Lat., we find antennæ always composed of three joints, the last of which, the longest, without stilet or seta, and divided into eight rings, is clavate in some, and almost cylindrical or in the form of an elongated cone in the others. The wings are usually incumbent on the body. The tarsi are furnished with three pellets.

These Insects may be united in one generic section.

XYLOPHAGUS.

In some, the antennæ are much longer than the head, with the two first joints very short and the third very long, compressed, forming a strangulated club, slightly geniculate in the middle, the inferior portion resembling an elongated cone, and the other an oval palette. The scutellum is unarmed.

HERMETIA, Lat. Fab.(2)

The antennæ of the others are never much longer than the head, and terminate by an almost cylindrical or elongated and conical joint.

Here, the scutellum is spineless.

XYLOPHAGUS, Meig. Fab. Lat.

Or Xylophagus proper, where the body is narrow and elongated, and the antennæ are evidently somewhat longer than the head, and terminated by an almost cylindrical joint. The head is short, transversal, and without any particular elevation anteriorly.

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(1) Lat., Gener. Crust. et Insect., IV, 286; Encyc. Méthod., article *Pachystome.* The larva of the *P. syrphoïde;* Panz., Faun. Insect. Germ., lxxvii, 9, the female; lives under the bark of the Pine; its pupa resembles that of a Tabanus.

(2) See Lat., and Fab.

X. ater, Lat., Gen. Crust. et Insect., I, xvi, 9, 10. Elongated; black; the mouth, a line on each side of the thorax, scutellum and legs, yellow. Found in the month of May, in the wounds, &c. of the Elm(1).

ACANTHOMERA, Wied.

Where the antennæ, as long as the head at most, terminate by a joint, forming an elongated cone, or almost resembling a punch, and compressed, of which the first ring is larger than the others; in this respect it bears some analogy to that of Tabanus. The head is hemispherical and the eyes are very large. The abdomen is broad and flattened, and the interocular space presents inferiorly a projection in the form of a horn or pointed rostrum. The two joints of the palpi are of equal length.

In another genus

RAPHIORHYNCHUS, Wied.

The first joint of these palpi is very short, and the second, much longer, terminates in a point. The remaining characters are identical with those of Acanthomera. The species of both these genera belong to South America(2).

There, the scutellum is armed with spines.

In these, the antennæ are simple.

CŒNOMYIA, Lat. Meig.—*Sicus*, Fab.

They are closely allied to the two preceding subgenera. The antennæ are hardly longer than the head, with the third joint conical or in the form of a punch; the first is evidently longer than the following one. The palpi are very apparent and cylindrical, terminate in a point and consist of two equal joints. The scutellum is armed with two spines.

C. ferruginea; Sicus ferrugineus, Fab., Meig., Dipt., II, xii,

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(1) The same works. Meig., Macq., family of the Xylophagi, and Wied.

(2) Wied., Dipt. Exot., II, 1, 1.

16, 25. Russet, with yellow or whitish spots or streaks on the abdomen. It sometimes varies, the thorax being occasionally brown, and the abdomen maculated with the same colour. It is very rare in the environs of Paris, but common in the department of Calvados. It is the *Mouche armée odorante* (*Strat. olens*) of the Tableau Elémentaire de l'Histoire Naturelle des Animaux. It diffuses a strong odour of Melilot sometimes even after death(1).

BERIS, Lat. Meig.

Where the antennæ are a little longer than the head, with their two first joints of equal length, and the third forming an elongated cone. The scutellum exhibits from four to six spines(2).

CYPHOMYIA, Wied.

Where the antennæ are still more elongated, with the third joint longer than the second; the third is linear and compressed. The scutellum has two spines(3).

Those have antennæ which throw out on each side, near the middle, three or four linear, hairy threads, the superior ones silky; they are almost setaceous near the extremity. The scutellum has four teeth.

PTILODACTYLUS, Wied.

They have the general appearance of a Beris and a Cyphomyia(4).

In the third section—*Stratiomydes,* Lat.—we also find antennæ consisting of three joints, the last of which, exclusive of the stilet or seta, presents at most five or six rings. This stilet, or that seta, exists in almost all of them, and in those where they are wanting, the third joint is elongated and fusiform, and always divided into five or six rings. The wings are always incumbent one on the other. In several of those species where the antennæ terminate in a somewhat oval and globular club, and always furnished with a stilet or a seta, the scutellum is not spinous.

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(1) See Lat., Fab., Meig. and Macq.

(2) See the same authors.

(3) Wied., Anal. Entom., 13, fig. 4.

The genus *Platyna* of this naturalist, established and figured in the same work, is wholly unknown to me. The Insect, on which he has formed it, has the port of a Beris and a Cyphomyia. The antennæ are equally long and filiform, with the two first joints elongated and cylindrical, and the last, judging from his figure of one of those organs, without rings. The scutellum has but one spine.

(4) *Stratiomys quadridentata,* Fab.

This section comprises the genus

STRATIOMYS, Geoff.

In some, the third joint of the antennæ is elongated, fusiform or conical, without a seta at the end, and almost always terminated by a bi-articulated stilet. The scutellum, in most of them, is armed with two spines or teeth.

Here the proboscis is very short. The anterior portion of the head does not project in the manner of a rostrum, receiving that organ inferiorly, and bearing the antennæ above. The latter are inserted in the front, as usual.

STRATIOMYS, Fab.

Or Stratiomys, properly so called, where the antennæ are much longer than the head, the first and last joint being greatly elongated; the latter is fusiform, or resembles a narrow and elongated club, narrowed at both ends, consisting of at least five distinct rings(1), without an abrupt stilet at the extremity. The two rings that compose it are not distinguished from the others by any sudden contraction.

The body of the larvæ is long, flattened, invested by a coriaceous or firm skin and divided into annuli, of which the three last form a tail terminated by numerous plumous hairs which radiate from the extremity. The head is squamous, small, oblong, and furnished with a great number of little hooks and appendages with which they agitate the water that constitutes their domicil. They respire by keeping their tail on the surface of the water, an orifice situated between the hairs at its extremity affording a passage to the air.

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(1) There are six of these rings, as in the following Insects, but the fifth is very short and indistinct. The two last are converted into a stilet or a seta.

Their skin becomes the cocoon of the pupa. They do not change their form, but become rigid and incapable of moving or bending their body; the tail is frequently at an angle with the trunk, and thus they float upon the water. The pupa only occupies one of the extremities of its cocoon, and the perfect Insect issues from it through a fissure which is effected in its second ring, and remains on its exuviæ, where its body becomes firm, and its development is completed.

A common species in France is the

S. chamæleon, Fab.; Rœs., Insect. II, Musc. v. Six lines in length; black; extremity of the scutellum yellow, and armed with two spines; three lemon-coloured spots on each side of the superior part of the abdomen(1).

ODONTOMYIA, Meig.

Where the antennæ are hardly longer than the head, with the two first joints short, and almost equal in length; the third forms a highly elongated, slender cone composed of at least five distinct rings, the last, conical, abruptly compressed and curved inwards, represents the extremity of the stilet, otherwise similar to the others(2).

EPHIPPIUM, Lat,—*Clitellaria*, Meig.

Where also the antennæ are hardly longer than the head, and the two first joints short, but the third forms a shorter and thicker cone, with the fourth ring conical, truncated, abruptly attenuated at the extremity, and terminated by a stilet of two joints, the last of which is much the longest and slightly arcuated.

E. vulgaris; Stratiomys ephippium, Fab.; Schœff., Monog., 1753. Deep black; thorax satin-red with a spine on each side and two on the scutellum. On the trunks of old Oaks(3).

OXYCERA, Meig.

The Oxyceræ resemble the Ephippia in the shortness of their antennæ which are also provided with a stilet; but the third joint is shorter, and not abruptly narrowed at the end; if we look at the profile of the antennæ we observe that the stilet, longer and more slender than in the preceding subgenus, and approximating more to the form of a seta, is not terminal but inserted on the back near the summit.

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(1) For the other species, see Latreille, Meigen and Macquart.

(2) Idem. M. Meigen now unites this genus with the preceding one.

(3) See the authors just quoted.

O. hypoleon; Strat. hypoleon, Fab,; Panz., Faun. Insect. Germ., I, 14. Variegated with black and yellow; scutellum yellow, and with two spines(1).

There, the proboscis is long, slender, siphoniform, geniculate at base, and lodged in the inferior cavity of a rostrum-like projection of the anterior part of the head, bearing the antennæ, of which the form and proportions are similar to those of the Ephippia.

NEMOTELUS, Geoff. Fab.(2)

In the others, the fourth joint of the antennæ, together with the third, forms an ovoid or globular club terminated by a long seta. The scutellum is rarely spinous.

CHRYSOCHLORA, Lat.—*Sargus*, Fab.

Where the third joint of the antennæ is conical and terminated by the seta(3).

SARGUS, Fab.

Where the same joint is almost ovoid, or nearly globular, rounded or obtuse at the summit, with the seta inserted on the back, near the junction of the fourth(4) ring with the preceding one; the first joint is almost cylindrical.

The scutellum is rarely spinous. The body is frequently elongated, green or cupreous, and brilliant.

S. cuprarius; Musca cupraria, L., Reaum., Insect., IV, xxii, 7, 8, De Geer, Insect., VI, xii, 14. Golden-green; abdomen cupreous-violet; legs black, with a white ring; wings long, with a brown spot.

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(1) Idem.

(2) Idem.

(3) *Sargus amethystinus*, Fab.

(4) The *Sargi*, whatever Meigen may say to the contrary, have the third joint divided into four rings.

The larva lives in cow-dung; the body forms an oblong oval, narrowed and pointed anteriorly, furnished with a squamous head provided with two hooks. The body is interspersed with hairs. It becomes a pupa under its own skin, and without any material change of form. The perfect Insect issues from its prison by driving off the anterior portion. See Réaumur, Insect., IV, Mem., IV and I.

S. Reaumurii, Meig. Differing from the cuprarius in the abdomen, most of which, or at least the base, is of a blood-red, or a brighter tint of the same colour(1).

VAPPO, Lat. Fab.—*Pachygaster*, Meig.

Only differing from Sargus in the antennæ, which are still shorter, with the two first joints shorter or wider, or altogether transversal(2).

Our second general division of the Diptera, which are provided with a sucker enclosed in a sheath, and whose antennæ consist of but three or two joints, comprises those whose proboscis, usually bilabiate, long, geniculate, and bearing the palpi a little above the elbow, is most commonly entirely contained in the oral cavity, and when always salient, has a sucker composed of only two pieces. The last joint of the antennæ, always accompanied by a stilet or seta, never exhibits annular divisions. The palpi, when at rest, are concealed.

This division will form our fifth family.

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(1) See the same authors.

Wiedemann, in his "Analecta Entomologica," has figured a Brazilian species, the *S. furcifer*, remarkable for the scutellum being armed with a long spine, forked at the extremity.

(2) See the same authors.

FAMILY V.

ATHERICERA.

Where the proboscis is usually terminated by two large lips. The sucker is never composed of more than four pieces, and frequently presents but two.

The larvæ have a very soft, extremely contractile, annulated body, narrowest and most pointed anteriorly. The head varies as to figure, and its external organs consist of one or two hooks, accompanied in some genera by mammillæ, and probably in all by a sort of tongue destined to receive the nutritious juices on which they feed. They usually have four stigmata, two situated on the first ring, one on each side, and the two others on as many circular, squamous plates, at the posterior extremity of the body. It has been observed that these latter, at least in several, were formed of three smaller and closely approximated stigmata. The larva has the faculty of enveloping these parts with the marginal skin, which forms a sort of purse. They never change their skin. That which invests them when first hatched becomes indurated, and thus forms a sort of cocoon for the pupa. It becomes shortened, assumes an ovoidal or globular figure, and the anterior portion, which in the larva was the narrowest, increases in diameter, or is sometimes even thicker than the opposite extremity. Traces of the annuli, and frequently vestiges of the stigmata are observed on it, although the latter no longer serve for respiration. The body is gradually detached from the skin or cocoon, assumes the figure of an elongated and extremely soft ball, on which none of its parts are perceptible, and soon passes into the state of a pupa. The Insect issues from its shell, by removing with its head the anterior extremity, which flies off like a cap, that part of the cocoon being so disposed as to facilitate this result.

But few of the Athericera are carnivorous in their perfect state.

They are generally found on trees, leaves and flowers, and sometimes on the fæces of animals.

This family comprises the genera *Conops* and *Œstrus* of Linnæus, and most of the species of his genus *Musca.*

We must naturally separate from the last those numerous species in which the sucker is composed of four pieces, and not of two, as in all the other Athericera. They will form our first tribe, that of the SYRPHIDÆ.

Their proboscis is always long, membranous, geniculate near the base, terminated by two large lips, and encloses the sucker in a superior groove. The upper piece of this sucker, which is inserted near the elbow, is broad, arched and emarginated at its extremity; the three others are linear and pointed, or setaceous; to each of the two lateral ones, representing the maxillæ, is annexed a little membranous, narrow palpus, slightly widened and rounded at the end; the inferior seta is analogous to the ligula. The head is hemispherical, and mostly occupied by the eyes, that of the males particularly. Its anterior extremity is frequently prolonged in the manner of a snout or rostrum, receiving the proboscis underneath when it is doubled. Several species resemble Bombi and other Wasps. M. Lepeletier de Saint-Fargeau has communicated to the Academie Royale des Sciences, some curious observations on the unnatural coition of some of these Insects, or to use his own words, on their "marriages adulterins," the result of which, however, he was unable to follow.

This tribe will comprise but the single genus

SYRPHUS.

A first general division will consist of all those species in which the proboscis is shorter than the head and thorax. The snout, in those where it is distinct, is perpendicular and short.

Then come Syrphidæ, in which the fore-part of the head, a little above the superior margin of the oral cavity, or near the origin of the snout, presents a prominence.

At the beginning of these species we will place those whose antennæ, always shorter than the head, are furnished with a plumous seta.

Their body is short, and frequently pilose, and the wings are distant. At the first glance these Insects resemble Bombi, and as the larvæ of several inhabit the nests of those Hymenoptera, it seems as if the author of nature clothed them in a similar manner, in order that they might penetrate into their habitations without danger.

The Syrphidæ compose three subgenera.

VOLUCELLA, Geoff. Lat. Meig. Fab.

Where the third joint of the antennæ or the palette is oblong; its contour forms a curvilinear and elongated triangle.

V. mystacea; *Musca mystacea*, L.; *V. bourdon*, De Geer, Insect. VI, viii, 2. Black, and densely pilose; thorax and extremity of the abdomen covered with fulvous hairs; origin of the wings fulvous.

The larva inhabits the nests of Bombi. Its body is widened from before posteriorly, is transversely rugose, has little points on the sides, six membranous radiating threads at the posterior extremity, and presents above, two stigmata and six pairs of mammillæ, each furnished with three long hooks which enable it to crawl. Here also comes the

M. à zones, Geoff.; *Syrphus inanis*, Fab.; Panz., Faun. Insect. Germ., II, 6. Eight lines long; but slightly pilose; fulvous; head yellow; two black bands on the abdomen. Its larva also lives in the nest of the Bombi(1).

SERICOMYIA, Meig. Lat.—*Syrphus*, Fab.

Where the palette of the antennæ is semi-orbicular(2).

ERISTALIS, Meig. Fab.

Which (restricting the subgenus to those species where the seta of the antennæ is evidently hairy) only differs from Sericomyia in the wings. Here the exterior and closed cell of the posterior margin, that which is situated near the angle of the summit, has a deep rounded emargination in the external side; in the preceding subgenus it is straight(1).

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(1) For the other species, see Lat., Meig., Fab. and Fallen.

(2) The same authors.

To these succeed other subgenera very analogous by the short form of the body, the triangular abdomen and by the antennæ, much shorter than the head, but where the seta is simple or without very apparent hairs.

In some, as in Eristalis, the external margin of the last external cell of the wings is strongly unisinuate. The body is generally hairy. The antennæ are closely approximated at base.

MALLOTA, Meig.—*Eristalis*, Fab.

Where the last joint of the antennæ forms a species of transversal trapezium, the widest side of which is before, and presenting when dilated an elliptical facet bordered all round(2).

HELOPHILUS, Meig.—*Eristalis*, Meig. Fab.

Where the palette of the antennæ forms a semioval. The body is generally less hairy than in the preceding subgenera.

The body of several of the larvæ is terminated by a long tail, whence their vulgar appellation of *vers à queue de rat*, or rat-tailed worms. They elongate and raise it perpendicularly to the surface of the water, or cloacæ in which they live, in order to respire through the aperture in its extremity. They are furnished internally with two large and extremely brilliant tracheæ, which, near the origin of the tail, form numerous plexus that are constantly in motion.

Reservoirs of rain-water contain numbers of these larvæ. Their tail may easily be mistaken for filaments of roots. See Réaum., Ins., IV, xxx.

H. tenax; *Musca tenax*, L.; *H. abeilliforme*, Réaum., Ins., IV, xx, 7. About the size of the male of the common Bee, and at the first glance resembles it in colours. The body is brown, covered with fine, yellowish-grey hairs, with a black streak on the front; two to four fulvous-yellow spots on each side of the abdomen.

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(1) The *E. intricarius, similis, alpinus*, Meig.

(2) See Meigen.

The larva inhabits muddy water, privies and gutters, and is one of those called *vers à queue de rat*. It is said to be so tenacious of life that no pressure can destroy it(1).

Other Syrphidæ differ from the last in the exterior and closed cell of the posterior margin; its external side being straight or but slightly sinuous. The antennæ are elevated at base and advance almost parallel with each other; their last joint is almost ovoid or nearly orbicular. The anterior projection of the head is very short. The abdomen is generally narrower and more elongated than in the preceding subgenera. The wings, in those where it is shortest, are generally distant.

SYRPHUS, Lat. Meig.—*Scæva*, Fab.

Or Syrphus properly so called, where the abdomen is gradually narrowed from base to point.

The larvæ feed exclusively on Aphides of all kinds, frequently holding them in the air, and soon exhausting them by suction. Their body forms a sort of elongated cone, and is very uneven, or even spinous. When about to become pupæ, they fix themselves to leaves, &c. with a kind of a glue. The body is shortened, and its anterior portion, which was previously the most slender, then becomes the thickest.

S. ribesii; Scæva ribesii, Fab.; De Geer, Insect., VI, vi, 8. Somewhat smaller than the *Musca vomitoria*; head yellow; thorax bronzed, with yellow hairs; scutellum of the same colour; four yellow bands on the abdomen, the first interrupted(2).

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(1) The Helophili of Meigen, and most of his Eristales, those in which the seta of the antennæ is simple, such as the *sepulchralis, æneus, tenax, cryptarum, nemorum, arbustorum*, &c.

We might pass from the Helophili to the Calliceræ, Ceriæ, Chrysotoxa, Paragi, Syrphi, terminate the division of those with a nasal prominence by the Bacchæ, and begin the division of those in which that elevation is wanting, with the Asciæ and Sphegina, Insects closely allied to the Bacchæ. Then would come Aphritis, Merodon, &c. This series would perhaps be more natural.

(2) Lat., Ibid. See Meigen. The *Chrysogaster*, Meig., appears to us to differ but slightly from Syrphus; the wings are incumbent on the body, a character which also belongs to several species of the preceding subgenus. The antennæ are almost identical in both; but in Chrysogaster the front of the females is canaliculated on each side, the nasal eminence is larger, and forms a small rounded lump, with an abrupt descent.

BACCHA, Meig. Fab.

Another subgenus closely allied to the preceding, only differing in the abdomen, which is proportionally longer, narrowed at base, and terminated in the manner of an elongated club.

To this subgenus, in my opinion, should be referred the Syrphus (*Scæva*, Fab.) *conopseus* of Meigen, although the palette of the antennæ is less orbicular than in Baccha(1).

We now pass to other subgenera, similar to the preceding ones, as to the form of the snout and the seta of the antennæ, but in which the length of these organs is at least equal to that of the face of the head.

Here, the antennæ are not placed on a common pedicle, and their length does not surpass that of the head.

PARAGUS, Lat., Meig.—*Mulio*, Fab.(2)

Here, they arise from a common eminence, and are longer than the head.

Sometimes the seta is lateral.

SPHECOMYIA, Lat.

Where it is inserted on the second joint; the last is much shorter than the two others, than the first in particular, and almost ovoid; the latter and the second are long and cylindrical.

I have established this subgenus on an Insect taken in Carolina by the late M. Bosc.

PSARUS, Lat. Fab. Meig.

Where the seta of the antennæ is inserted on the back of the third joint, near its extremity; this joint almost borders on an oval, and is nearly of equal length with the second; the first is much shorter. The common peduncle is proportionally higher than in the analogous subgenera. The wings are incumbent(3).

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(1) Meig., Ibid.

(2) See Latreille and Meigen.

(3) Idem.

CHRYSOTOXUM, Meig.—*Mulio*, Fab.

Where the seta is also inserted on the third joint but near its base; this joint is the longest of all, and forms a narrow and elongated triangle; the two others are almost of equal length. The wings are distant(1).

Sometimes the seta, always thick and in the form of a stilet, terminates the antennæ.

CERIA, Fab.

Where the body is oval, elongated, and resembles that of a Wasp; the second joint of the antennæ is of equal length with the last, and forms with it a fusiform club with a very short stilet. The abdomen is long and cylindrical. The wings are very remote, and the exterior cell of the posterior margin has a well-marked re-entering angle in the outer edge(2).

CALLICERA, Meig.

Where the body, shorter, wider and silky, has the general appearance of that of the common Fly. The second joint of the antennæ, shorter than the last, forms with it an elongated, compressed, fusiform and slightly arcuated club; the seta is in the form of an elongated stilet; the first joint is longer than the following one. The exterior cell of the posterior margin exhibits no emargination in its sides(3).

The nasal tubercle which distinguishes the preceding Syrphidæ, disappears in the following ones. The seta of the antennæ is almost always simple. The wings are incumbent, one on the other.

The first are connected with the preceding ones by the length of their antennæ. Those organs are closely approximated at base; the second joint, the shortest of all, forms, with the third, a narrow and elongated club; the seta is simple and inserted near the base of the latter.

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(1) Item.

(2) See Fab., Lat., Meig. and Wiedemann.

(3) See Lat., Meig.

CERATOPHYA, Wied.

Scutellum unarmed; third joint of the antennæ nearly twice the length of the first(1).

APHRITIS, Lat.—*Mulio*, Fab.—*Microdon*, Meig.

Where the scutellum presents two teeth; the first joint of the antennæ is almost as long as the two following ones taken together.

In this and the preceding subgenus, as in Ascia, the two first closed cells of the posterior edge are terminated in the manner of an angle(2).

The antennæ of the following Syrphidæ are shorter than the head.

The posterior legs are often large, particularly in one of the sexes.

Sometimes the pallet of the antennæ is oblong and almost in the form of an elongated triangle. The posterior thighs are thick and dentated. The wings are incumbent, one on the other.

MERODON, Meig. Fab.—*Milesia*, *Eristalis*, Lat.—*Syrphus*, Fab.

Where the abdomen is triangular or conical, without being narrowed at base, and where the external cell of the posterior edge of the wings is deeply emarginated exteriorly.

M. narcissi; Eristalis narcissi, Fab.; Réaum., Insect. IV, xxx. Obscure-bronze, but covered with fulvous down; legs black; inner side of the posterior legs tuberculous.

The larva feeds on the interior of the bulb of the Narcissus(3).

ASCIA, Meg. Meig.

Where the abdomen is narrowed at base and clavate. The two first closed cells of the posterior edge of the wings terminate in an angle; the exterior side of the first is straight(4).

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(1) Wied., Anal., Entom., fig. 9.

(2) See Lat., Gener. Crust. et Insect., IV, 329, Meig. and Fallen.

(3) See Meigen.

(4) Idem.

Sometimes the palette of the antennæ is short, or moderately elongated, and either almost orbicular or nearly ovoid.

Here, as in the last subgenus, the abdomen is narrowed at base and clavate.

SPHEGINA, Meig.

Where the palette of the antennæ is orbicular. The posterior thighs are clavate and spinous underneath(1).

There, the abdomen is either triangular or conical, or almost cylindrical.

In some, the wings hardly extend beyond the abdomen, which is frequently narrow and elongated.

We will separate those whose posterior thighs are strongly inflated, with the inner side armed with small spines. The closed cells of the posterior border of the wings are sinuous posteriorly.

EUMERUS, Meig.

To which we unite his *Zylotæ*, where the abdomen is merely narrower and almost linear, and which we formerly placed among the Milesiæ. Such is the

> *E. pipiens; Musca pipiens*, L.; Panz.; Faun. Insect. Germ. XXXII, 20. About four lines in length; black; each side of the abdomen spotted with white. The humming it produces while on the wing is mingled with a sharp sound resembling the note of a young chicken(2).

In the two following subgenera, the posterior thighs sometimes differ but little from those of the preceding ones, and are sometimes thicker, but unidentated at most.

MILESIA, Lat. Fab. Meig.—*Tropidia*, Meig.

Where the two posterior legs are abruptly larger than the others, with thick and unidentated thighs in several. The body is elongated, and the abdomen conical, or almost cylindrical and convex(3).

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(1) Idem.

(2) See Meigen, genera *Eumerus* and *Xylota*.

(3) Idem, genera *Mylesia, Tropidia*. The palette of the antennæ of the Tropidiæ is proportionally wider, and as if truncated or very obtuse.

PIPIZA, Meig.—*Psilota*, Meig.—*Eristalis*, Fab.—*Milesia*, Lat.

Where the posterior legs are merely somewhat larger than the others, and the abdomen is depressed, semi-elliptical and rounded at the end. The eyes are pubescent. These Insects are closely allied to Syrphus, and particularly to Chrysogaster, Meig.(1)

BRACHYOPA, Hoff. Meig.

Distinguished from all the preceding subgenera by the wings, which extend considerably beyond the abdomen. These Diptera closely resemble the Milesiæ, and appear to lead to Rhingia, the last subgenus of this tribe. According to Meigen the seta of the antennæ is pilose at base, but I never could discover those hairs in any of the specimens I obtained. To this subgenus the same naturalist refers the *Oscinis olivæ* of Fabricius, which most certainly belongs to the Muscides(2).

In those Syrphidæ of which we have hitherto spoken, the proboscis is shorter than the head and thorax, and the projection forms a short and perpendicular rostrum. We now proceed to others in which that proboscis is evidently longer and almost linear, and the anterior projection of the head is proportionally more elongated, and directed forwards in the manner of a pointed rostrum. These Insects, in their wings, which are incumbent on the body, and in the form of their antennæ, closely resemble the Brachyopæ and Milesiæ. The thighs are simple. They form the

RHINGIA, Scop. Fab. Meig.(3)

The genus

PELECOCERA, Hoffmanseg,

Figured by Meigen, is unknown to us, but it is easily distinguished from all those whose antennæ are shorter than the head by the seta of the same organs which is short, thick, slightly silky, cylindrical, and divided into three joints, the last of which is somewhat the longest. The palette almost forms a reversed triangle.

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(1) Idem, genera *Pipiza* and *Psilota*.
(2) See Meigen.
(3) Fab., Lat., Meig., &c.

The sucker of all the remaining Athericera consists of but two setæ, the superior representing the labrum, and the inferior the ligula.

They form three other small tribes which will correspond to the genera *Œstrus* and *Conops* of Linnæus, and to the *Musca*, Fab. as originally composed.

As Stomoxys and Bucentes are connected with this last genus, we will begin with the tribe of the ŒSTRIDES consisting of the genus

ŒSTRUS, Lin.

Which is very distinct, as in place of the mouth we find but three tubercles, or slight rudiments of the proboscis and palpi.

These Insects resemble large and densely pilose flies, and their hairs are frequently coloured in bands like those of the Bombi. Their antennæ are very short; each one is inserted in a fossula over the front, and terminated by a rounded palette with a simple seta on the back near its origin. Their wings are usually remote; the alulæ are large and conceal the halteres. The tarsi are terminated by two hooks and two pellets.

These Insects are rarely found in their perfect state, the time of their appearance and the localities they inhabit being very limited. As they deposit their eggs on the body of various herbivorous quadrupeds, it is in woods and pastures that we must look for them. Each species of Œstrus is usually a parasite of one same species of some mammiferous animal, and selects for the location of its eggs the only part of its body that is suitable for its larvæ, whether they are to remain there, or pass from thence to the spot suited for their development. The Ox, Horse, Ass, Rein-deer, Stag, Antelope, Camel, Sheep and Hare are the only quadrupeds yet known, which are subject to be inhabited by the larvæ of the Œstri. They seem to have an extraordinary dread of the Insect when it is buzzing about them for the purpose of depositing its eggs.

The domicil of the larvæ is of three kinds; we may distinguish them by the names of *cutaneous*, *cervical*, and *gastric*, as some live in the lumps or tumours formed on the skin, others in some part of the interior of the head, and the rest in the stomach of the animal destined to support them. The eggs that produce the first are deposited by the mother under the skin by means of a squamous ovipositor composed of four tubes fitting one within the other, armed at the end with three hooks and two other appendages. This instrument is formed by the last annuli of the abdomen. These larvæ called *taons* by the farmers are not compelled to change their domicil, finding themselves when hatched in the midst of the purulent matter on which they feed. The ova of the others are simply deposited and glued to various parts of the skin, either in the vicinity of the natural cavities into which the larvæ are to penetrate and take up their abode, or on those spots which the animal is in the habit of licking, in order that the larvæ may be transported on its tongue into its mouth, where they can proceed to their destined dwelling. Thus the female *Œstrus ovis* places her eggs on the internal margin of the nostrils of the Sheep, which is no sooner aware of it, than it becomes agitated, strikes the earth with its feet and flies, with its head to the ground. The larva insinuates itself into the maxillary and frontal sinuses, and clings to their lining membrane by means of the two stout hooks with which its mouth is armed. It is thus also that the *Œstrus equi* deposits her eggs at intervals, without alighting and by balancing her body in the air, on the inner side of the legs of the Horse, on the side of the shoulders, and rarely on the withers. The *Œ. hæmorrhoidalis*, whose larvæ also inhabit the stomach of the same animal, places her eggs on his lips. The larvæ cling to his tongue, and descend through the esophagus into the stomach where they feed on the humour secreted by its lining membrane. They are usually found round the pylorus, and rarely in the intestines. They are frequently suspended there, in clusters, in great numbers. M. Clark however is of opinion, that they are rather useful to the animal than injurious.

The larvæ of the Œstri are usually conical and destitute of feet. Their body, exclusive of the mouth, is composed of eleven annuli, covered with little tubercles and small spines, frequently arranged like cords, that facilitate its progression. The principal organs of respiration are situated on a squamous plane of the posterior extremity of body, which is the largest. It appears that their number and disposition are different in the gastric larvæ. It also seems that the mouth of the cutaneous larvæ is only composed of mammillæ, whilst that of the internal ones is always armed with two stout hooks.

Both kinds, having acquired their growth, leave their abode and fall to the ground, in which they conceal themselves, in order to become pupæ under their own skin, like other Diptera of this family. Those, which inhabit the stomach follow the track of the intestines, and aided perhaps by the fœcal discharge of the animal, escape per anum. These metamorphoses usually occur in June and July.

M. de Humboldt met with Indians in South America, whose abdomen was covered with little tumours, produced, as he presumed, by the larvæ of an Œstrus. More recent observations seem to corroborate this opinion. They perhaps belong to some species of the genus CUTEREBRA of M. Clark, whose larvæ live under the skin of certain Mammalia.

It would also appear, that larvæ, analogous to those of an Œstrus, have been withdrawn from the maxillary or frontal sinuses of Man; but these observations have not been sufficiently prosecuted(1).

Œ. bovis, De Geer; Clarck., Lin. Trans., III, xiii, 1, 6. From six to seven lines in length, and densely pilose; thorax yellow, with a black band; abdomen white at base, with a fulvous extremity; wings somewhat obscure.

The female deposits her eggs under the hide of healthy Oxen and Cows, of not more than two or three years of age. The consequence of this operation are tumours or lumps, on the internal pus of which the larvæ feed. Horses also are subject to them.

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(1) In the second edition of the Nouv. Dict. d'Hist. Nat., article *Œstre*, I have published a new systematic arrangement of these Insects.

Some have a very distinct and retractile proboscis: the genus CUTEREBRA of M. Clarck, and the CEPHENEMYIA, Lat. In the first, the seta of the antennæ is plumous, and the palpi are not apparent. The *Œstrus buccatus* of Fabricius belongs to this genus. M. Clarck has described another species, the *cuniculi*, and I have published a third, the *ephippium*; they are all from America. The seta of the antennæ is simple in the Cephenemyiæ, and the palpi are apparent. The *Œstrus trompe*, Fab., is the type of the genus.

The others are destitute of a proboscis: the seta of the antennæ is always simple. Two palpi are still visible in the ŒDEMAGENA, a genus established on the *Œst. tarandi*.

In the three following genera they disappear.

The Hypodermæ—HYPODERMA—have a small oval slit in the form of a Y. Such is the character of the *Œstrus bovi*. The Cephalemyiæ—CEPHALEMYIA—have two very small, punctiform tubercles, which are vestiges of the palpi. The wings are distant, and the alulæ cover the halteres—*Œstrus ovis*. In the Œstri—ŒSTRUS—these two tubercles also exist, but the wings are crossed on their inner margin, and the alulæ only cover a portion of the halteres—*Œstrus equi*, Fab., and some others. M. Meigen calls this last genus *Gastrus*; it is the *Gasterophilus* of Dr Leach. All the others, according to these gentlemen, form the single genus *Œstrus*. Here, the posterior cells are closed by transverse nervures, before they reach the posterior margin; in *Gastrus*, they are closed by that margin. We have described these and some other characters in the Nouv. Dict. d'Hist. Nat., article *Œstre*.

The Rein-Deer, Antelope, Hare, &c., also nourish various larvæ of Œstri, but of a different species.

Œ. ovis, L.; Clarck, Lin. Trans., III, xxxii, 16, 17. Five lines in length, and but slightly pilose; head greyish; thorax cinereous, with elevated black points; abdomen yellowish, finely spotted with brown or black; legs pale-brown; wings transparent.

The larva inhabits the frontal sinus of the Sheep. That of the species called *trompe*, Fab., is found in the same parts in the Rein-Deer.

Œ. equi, Lat.; Clarck, Ibid., xxxiii, 8, 9. But slightly pilose, and of a fulvous-brown; abdomen paler; two points and a band on the wings, black.

The female deposits her ova on the legs and shoulders of Horses; the larvæ inhabit their stomach.

Œ. hæmorrhoidalis, L.; Clarck, Ibid., 12, 13. Densely pilose; thorax black, with a pale yellow scutellum; abdomen white at base, black in the middle, and fulvous at the end; wings immaculate.

The female deposits her eggs on the lips of Horses, and the larvæ live in their stomach.

Œ. veterinus, Clarck, Ibid., 18, 19. Completely covered with russet hairs; those on the sides of the thorax and base of the abdomen, white; wings immaculate.

The larva inhabits the stomach and intestines of the same animal. It is possible that the female may deposit her ova on the margin of the anus.

The third tribe of the Athericera, that of the CONOPSARIÆ, is the only one of that family in which the proboscis is either always salient and siphoniform, cylindrical or conical, or setaceous. The reticulation of the wings is the same as in our first division of the Muscides.

Most of these Insects are found on plants. They form the genus

CONOPS, Lin.

In some the body is narrow and elongated, the abdomen clavate, curved underneath, and with the male organs of generation salient. The second joint of the antennæ is at least almost as long as the third, which, either alone, or most commonly conjointly with it, forms a fusiform, or ovoid and compressed club.

Here, the proboscis projects and is only geniculate near its origin.

Sometimes the antennæ are much longer than the head, and terminated in a fusiform club. The wings are distant.

SYSTROPUS, Wied.—*Cephenes*, Lat.

Where the last joint of the antennæ alone forms the club, and is destitute of a stilet. The abdomen is long and slender. These Insects, peculiar to North America, resemble little Spheges. Their antennæ are longer in proportion than those of Conops, and their proboscis slightly ascends(1).

CONOPS, Fab. Lat. Meig.

Or Conops, properly so called, where the two last joints of the antennæ formed a club, with a terminal stilet.

C. macrocephala. Fab. Black; antennæ and legs fulvous; head yellow, with a black streak; four annuli of the abdomen margined with yellow; edge of the wings black.

C. rufipes, Fab. Black; abdominal annuli edged with white; base of the abdomen and legs, fulvous; edge of the wings black.

It undergoes its metamorphosis in the abdomen of living Bombi, and issues from between the rings of the abdomen. A footless larva found in the B. lapidaria—*Apis lapidaria*, L.—and perhaps that of this species of Conops, has furnished the late M. Lachat and M. Audouin with a subject for some excellent anatomical observations(2).

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(1) Wiedemann, Dipt. Exot., I, vii.

(2) See Fab., Lat., Meig., &c., and the first volume of the Mém. de la Soc. d'Hist. Nat. de Par., &c.

Sometimes the antennæ are shorter than the head, and terminate in an ovoid club. The wings are crossed on the body.

Zodion, Lat. Meig.(1)

There, the proboscis is geniculate near the base, and again about the middle, with its extremity bent underneath. The antennæ are shorter than the head, and terminate in a palette with a stilet.

Myopa, Fab.

To which belongs the

M. ferruginea, Fab. Russet, with a yellow front and blackish wings(2).

The others, *Stomoxydæ*, Meig., in their general form, disposition of their wings, their palette-terminated antennæ shorter than the head and accompanied by a seta, and in their triangular or conical abdomen without external appendages, resemble common Flies.

Stomoxys, Geoff., Fab.(3)

Where the proboscis is only geniculate near its base, and then advances directly forwards.

C. calcitrans, L.; De Geer, Insect., VI, iv, 12, 13. Seta of the antennæ pilose; body cinereous-grey spotted with black; proboscis shorter than the body. It bites our legs severely, particularly on the approach of rain(4).

Bucentes, Lat.—*Stomoxys*, Fab.—*Siphona*, Meig.

Where the proboscis is bi-geniculate as in Myopa(5).

The genus *Carnus* of Professor Nitzsch—Insect. Epiz., Magas. der Entom., of Germar—which he refers to our family of the Conopsariæ is distinguished from the preceding ones in the presence of rudiments of wings. The species which serves as its type is figured by M. Germar in his Faun. Insect. Eur., fasc. IX, tab. 24.

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(1) Lat., Gen. Crust. et Insect., 336; Meig., Dipt., xxxvii, 1, 7.

(2) See Fab., Lat., Meig., Fall., &c.

(3) Messrs Lepeletier and Serville—Encyc. Méthod., X, 500—have formed a new genus Prosena, which they have separated from the preceding one, on account of its much longer proboscis—four times the length of the head—and the seta of the antennæ, which is bearded on both sides.

(4) Fab., Lat. Meig., Fall., &c.

(5) Lat., Gener. Crust. et Insect., IV, 359; Meig., Dipt., xxxvii, 18, 25.

The direction of its proboscis, the form of its antennæ and that of its body seem to indicate its proximity to Stomoxys.

Our fourth and last tribe, that of the MUSCIDES, is distinguished from the three preceding ones by a very apparent, always membranous and bilabiate proboscis, usually bearing two palpi (the Phoræ alone excepted), susceptible of being entirely retracted within the oral cavity; and by a sucker composed of two pieces. The antennæ always terminate en palette with a lateral seta. These Athericera embrace the old genus *Musca* of Fabricius, which the labours of Messrs Fallen and Meigen, without mentioning our own, have greatly modified. All the difficulties however which beset its study are far from being removed; for although those gentlemen have established a great number of new genera, there are still some, *Tachina* and *Anthomyia* for instance, which can only be considered as general repositories. In the work of Meigen which is wholly restricted to the Diptera of Europe, the first of these genera is composed of three hundred and fifteen species, and the second of two hundred and thirteen. Dr Robineau Desvoidy, wishing to complete these researches, and to meet the demands of the science, has devoted himself with much zeal to the special study of the Muscides, which he calls *Miodaires;* and the Memoir on this subject, which he presented to the Royal Academy of Sciences, has been deemed worthy of insertion among those of that institution; but as that paper is not completed, and as we are only acquainted with its general divisions as given by M. de Blainville in his report to the Academy, we are unable to profit by it. Independently of this we should have been compelled to pass beyond our prescribed limits, and perhaps have terrified the young naturalist, by an exposition of the multitude of new genera he has established in this tribe, several of which, even in the opinion of the reporter, appear to differ but little from each other. We even think that the work of M. Meigen, with the exception of the revision of the two genera above mentioned, is amply sufficient for the actual wants of the science.

Dr Desvoidy has employed but very few characters of his own in designating these groups. There are even some, which he might have used to advantage, such as the disposition of the nervures of the wings, which he has neglected, at least in the work presented to the Academy. His first family, that of the *Calypterees*, is identical with the one I call *Creophiles* in my "Familles Naturelles du Règne Animal" and which, besides, was already established in my preceding works. According to the analysis of his Memoir given by M. de Blainville, it is evident that the characters of the nine other families of the Myodaires are generally founded on the mere diversity of their mode of habitation, their colours, and on some other vague considerations.

We will endeavour to arrange the genera of Messrs Wiedemann and Fallen which we have been able to study, in our former method, but with some modifications which the observations of these celebrated naturalists, and others of my own, render necessary.

This tribe will comprise the genus

MUSCA, Lin.

Antennæ inserted near the front, palpi placed on the proboscis, and retiring with it into the oral cavity, and transverse nervures in the wings, characterize a first section of the winged Muscides, which will include eight principal groups or sub-tribes.

Those of our first division, the CREOPHILÆ, have large alulæ which almost completely cover the halteres. The wings are almost always distant, with the two terminal and exterior cells of the posterior edge(1) closed by a transverse nervure.

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(1) The most external one is situated under a narrow, elongated cell, closed by the posterior margin, which may be considered as a sort of cubital cell. In the following divisions, this exterior cell is not closed by a transverse nervure. The second, or that which adjoins the inner side of the preceding one, is also closed in the last of the Muscides; but it is no longer terminal, and frequently it is even

Of the species which always present these characters, we will distinguish those whose epistoma does not project in the manner of a rostrum, and the sides of whose head are not prolonged in the form of horns.

In some, the seta of the antennæ is simple or without any very apparent hairs.

In one single subgenus

ECHINOMYIA, Dum.—*Tachina*, Fab. Meig.

The second joint of the antennæ is the longest of all. The last or the palette is widest, compressed, almost in the form of a reversed triangle or trapezoidal. The seta is biarticulated inferiorly.

E. grossa; Musca grossa, L.; De Geer, Insect., VI, 1, 12. The largest species known, and almost of the size of a Bombus; black, bristled with thick hairs; head yellow; eyes brown; origin of the wings russet. It hums loudly while on the wing, alights on flowers, in the woods, and frequently on cow-dung.

The larva lives in the latter substance; its body is yellowish, glossy and conical, furnished with a single hook and two small fleshy horns at its anterior extremity or the point; the opposite end is terminated by a circular plane on which are two stigmata, each formed of a lenticular and brown plate raised in the middle. The second annulus of the body, the head counted as one, also presents a stigma on each side. The posterior extremity of the cocoon of the pupa, which is also conical, presents two more distinct stigmata; its contour is formed by a nine-sided lamina. See Reaum., Insect., IV, xii, 11, 12; and XXVI, 6—10(1).

In the other Creophilæ, the third joint of the antennæ is longer than the preceding one, or at least is never shorter.

Sometimes the anterior face of the head is almost smooth, or presents but very short hairs, arranged as usual in two longitudinal rows, none of which are much larger than the others.

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shorter; the longitudinal nervures which form the sides, are prolonged to the posterior margin, thereby forming another cell, which becomes terminal and incomplete. In the Creophilæ, the two nervures are not (or but very slightly) prolonged beyond the closed cell.

(1) Division A of the genus *Tachina*, Meig. The species called *ferox* has its palpi dilated in the form of a spatula, and constitutes the genus *Fabricia* of M. Robineau. The *Stomoxys bombilans*, Fab., has the facies of the Echinomyiæ, and the proboscis of the Bucentes.

Here the abdomen is always convex, with very distinct, and more or less triangular annuli.

In these, the seta of the antennæ, of which the second joint is much elongated, is geniculate, and forms an angle near its middle, at the junction of that joint with the following one, or the last division of the seta.

GONIA, Meig.(1)

In those, as in the other Creophilæ, the seta of the antennæ is not geniculate near its middle.

MILTOGRAMMA, Meig.

Where the third joint of the antennæ is much longer than the preceding one(2).

TRIXA, Meig.

Where its length but little exceeds that of the second(3).

There the abdomen is sometimes strongly inflated, and, as if vesicular, with the divisions of the annuli but slightly marked; sometimes it is much flattened. The wings in the last case are very distant, and frequently somewhat arcuated exteriorly.

GYMNOSOMIA, Meig.—*Tachina*, Fab.

Where the abdomen is inflated, as if vesicular or ovoid, with the separation of the annuli rather indistinct; the antennæ are as long as the face of the head, the second and third joints of almost equal length, and the latter linear(4).

CISTOGASTER, Lat.

Where the form of the abdomen is the same; but the antennæ are much shorter, with the third joint longer than the preceding one, almost square, somewhat larger, and rounded at the end(1).

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(1) Meigen.
(2) Idem.
(3) Idem.
(4) Idem.

Phasia, Meig.—*Thereva*, Fab.

Where the abdomen is strongly flattened, and almost semicircular; the tibiæ are simply furnished with little hairs(2).

Trichiopoda, Lat.—*Tachina*, Fab.

Where the abdomen is also flattened, but oblong, and the two posterior tibiæ are provided exteriorly with a fringe of lamelliform cilia(3).

Sometimes the anterior face of the head presents two ranges of long hairs, forming a sort of moustachios, two of which are usually the longest, and situated at the superior extremity of the buccal cavity, one on each side.

In some, the wings are vibratile, and the abdomen is narrow, elongated, almost cylindrical, or forming an elongated cone. They form three subgenera.

In the wings of the two first, as in those of the preceding ones and most of the others, the two external and closed cells of the posterior extremity are almost equally prolonged backwards; the outer one extends somewhat beyond the other, and its posterior angles are acute. The antennæ are as long as the face of the head, or hardly shorter.

Lophosia, Meig.

Where the last joint of the antennæ forms a very large triangular palette(4).

Ocyptera, Meig. Fab.

Where the same joint of those organs, hardly wider than the penultimate, resembles a linear palette, or one forming a long square.

In a "Mémoire pour servir a l'Histoire du genre Ocyptera,"—Ann.

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(1) Confounded with the preceding subgenus.

(2) Lat., Gener. Crust. et Insect., IV, 344; see also Fab. and Meigen.

(3) The *Thereva plumipes*, *lanipes*, Fab., and various undescribed species, all from America.

(4) See Meigen.

des Sc. Nat., X, 248, 11—M. Leon Dufour has described the larvæ of two species; the *O. cassidæ* and the *O. bicolor*. That of the first species lives in the visceral cavity of the *Cassida bicolor*, and that of the second in the same situation in the *Pentatoma grisea*. Both of them feed exclusively on the epiploon or corps graisseux of their hosts. Their body is oblong, soft, whitish, perfectly glabrous, rugose and contractile.

Its anterior extremity presents two mammillæ, each furnished with two little cylindrical bodies terminated in the manner of a button umbilicated in the centre, and with as many strong, horny pieces, each provided exteriorly with one or two large hooks, which gives them the appearance of being forked, and their convex sides placed back to back. From the figure given by this naturalist, it would seem that there is one for each mammilla, and that they are internal. He considers them as mandibles, and the species of palpi, of which we have just spoken, the disk of which is perforated in the centre, as a sort of foot-palpi, acting like a cup or organs of touch. The body of these larvæ terminates by a sort of siphon, about one third as long as the body, of a more solid consistence and constant form that becomes gradually narrowed, and with the appearance of two hooks at the end. The posterior extremity of this siphon occupying one of the metathoracic stigmata, and being in contact with the air, enables the larva to respire. Neither antennæ nor eyes can be perceived. It is in this same abode that the larva passes into the state of a pupa. The latter is ovoid, exhibits no trace of annuli, and presents at one extremity four (*O. cassidæ*) or six (*O. bicolor*) tubercles. It leaves its domicil previously to attaining its perfect condition, sometimes while the Insect in which the larva resided is still living, and sometimes at the expense of its life. These larvæ have two salivary vessels, four biliary vessels, and tubular tracheæ without a nacred aspect, or transverse striæ, arranged in two principal trunks, and giving off numerous ramifying branches. These trunks appear to empty into a unique orifice at the base of the caudal siphon. The alimentary canal is about four times the length of the body, and presents a capillary œsophagus, a crop resembling a turbinated bowl of a pipe, which insensibly degenerates into a tubular, doubled stomach, followed by a flexuous intestine, a slightly apparent rectum, and terminated by an oblong cæcum(1).

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(1) Idem., and the Encyc. Méthod., article *Ocyptère*.

In the following subgenus, or

MELANOPHORA, Meig.

Which he suppresses and unites to *Tachina*, the antennæ are much shorter, their extremity, when they are inclined, scarcely extending beyond half the length of the face of the head. The most exterior of the two complete cells, which terminate the wing, is much more prolonged posteriorly than the other, and the internal angle of its extremity is obtuse(1).

The abdomen of the other Creophilæ is but slightly elongated and triangular; the wings do not vibrate.

PHANIA, Meig.

Where the posterior extremity of the abdomen is elongated, narrowed and bent underneath. The third joint of the antennæ is elongated and linear. The wings, according to the figures of Meigen, closely resemble those of the preceding subgenus. According to the same author, the abdomen, as in the Lophosiæ and Ocypteræ, presents but four apparent annuli(2). In the subgenus

XYSTA, Meig.

There are from five to six. The antennæ are short, and their two last joints nearly of an equal length. The posterior tibiæ are slightly arcuated, compressed and ciliated.

This subgenus appears to us to constitute the transition from the Gymnosomiæ to the Phasiæ, and also to approach the Trichiopoda. The equivocal nature of the character drawn from the presence or absence of hairs on the face of the head, employed by M. Meigen, is easily perceived. Certain species of Trichiopoda are ambiguous in this very respect(3).

TACHINA, Fab. Meig.

Where the abdomen is not curved underneath at its posterior extremity, and exhibits externally but four annuli. The antennæ are as long as the head or nearly so, and terminated by a joint longer than the penultimate.

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(1) Lat., Gener., Crust. et Insect., IV, 346.

(2) See Meigen.

(3) Idem.

Certain species, forming a particular section, in their larva state inhabit the body of various caterpillars which they destroy(1).

We now pass to Creophilæ in which the seta of the antennæ is evidently pilose or plumous. Their third joint always forms an elongated palette, longer than the preceding one.

DEXIA, Meig.

The Dexiæ have the general appearance of the Ocypteræ, their abdomen being narrow and elongated, particularly in the males(2).

MUSCA, Lin. Fab. Meig.—*Mesembrina*, Meig.

In Musca, properly so called, or the true *Fly*, the abdomen is triangular, and the eyes are contiguous posteriorly, or closely approximated in the males.

Here come most of those Flies whose larvæ feed on carrion, meat, &c.; others of the same subgenus inhabit dung. They all resemble soft, whitish worms without feet, thickest and truncated at the posterior extremity, and becoming gradually smaller towards the opposite one, which terminates in a point furnished with two hooks, with which they divide their aliment, and accelerate its decomposition. The metamorphosis of these Insects is effected in a few days. The posterior extremity of the abdomen of the females is narrowed and prolonged in the manner of a tube or ovipositor, by which she can insert her eggs.

> *M. vomitoria*, L.; Rœs., Insect., II, Musc., et Cul., ix, x. A large species; front fulvous; thorax black; abdomen glossy-blue with black streaks.
>
> This Insect enjoys the sense of smell to a high degree, announces its presence in our dwellings by a loud humming, and deposits its ova on meat. Deceived by the cadaverous odour arising from the Arum dracunculus, L., when in flower, it also

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(1) This genus also is in great confusion in the work of Meigen, and consists of species with very different antennæ and wings, as is evident from his figures. We have removed the Echinomyiæ and the Melanophoræ; until the work of Dr Desvoidy is published we will leave the other species in the genus *Tachina*.

(2) See Meigen.

leaves its eggs there. When the larva is about to become a pupa, it abandons the putrescent matters in which it has lived, which might then prove injurious to it, and penetrates, if possible, into the earth, or is metamorphosed in some dry and retired spot.

M. cæsar, L. Body, a glossy golden-green; legs black. The female deposits her eggs on carrion.

M. domestica, L.; De Geer, Insect., VI, iv, 1—11. The thorax of the *Common Fly* is of a cinereous-grey with four black streaks; abdomen blackish-brown spotted with black, and yellowish-brown above. The five last abdominal annuli of the female form a long and fleshy tube which she introduces, in coitu, into a slit situated between the pieces furnished with hooks, that terminate the abdomen of the male, and characterize his sex. The larva lives in warm and moist dung(1).

SARCOPHAGA, Meig.—*Musca*, Lin. Fab.

Only differing from Musca proper by the eyes being remarkably distant in both sexes. The ova are sometimes hatched in the venter of the mother—these species are called *viviparous*.

S. carnaria; *Musca carnaria*, L.; *Mouche vivipare*, De Geer, Insect., VI, iii, 3—18. Rather larger and more elongated than the *vomitoria*; body cinereous; eyes red; streaks on the thorax and square spots on the abdomen, black.

The female is viviparous and deposits her larvæ, which fill the cavity of her abdomen, on meat, carrion, and sometimes in wounds in the human body. By strongly pressing the abdomen of the male, a bowel-like body of a transparent white may be made to protrude, which has a vermicular motion that is continued even after the Insect has been cut in two(2).

We will terminate the Creophila with genera which form a contrast with the preceding ones, either in certain peculiarities of the head, or by the situation of the wings, or the cells of their posterior extremity.

The seta of the antennæ is pilose in most of them.

In some, such as the two following subgenera, the wings terminate in the same manner as in the preceding ones, or present two complete cells between the middle and the edge.

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(1) See Meigen: certain species that are more hairy form his genus *Mesembrina*.

(2) See Meigen.

ACHIAS, Fab.

Remarkable for the horn-like prolongations of the sides of the head, and approximating in this respect to Diopsis; but their antennæ are inserted high on the front, and similar in form and proportions of the joints to those of the Muscæ; the wings are distant(1).

IDIA, Meig. Wied.

Where the anterior extremity of the head projects in the manner of a horny rostrum; the wings are incumbent on the body(2).

In the other two and last subgenera of the Creophilæ, the terminal cells of the wings are closed by the posterior margin. The eyes are very remote. The abdomen is flattened.

LISPE, Lat. Fab. Meig.—*Musca*, De Geer.

Where the body is oblong, the antennæ inserted near the front, almost as long as the face of the head, with the last joint much longer than the preceding ones, linear, and furnished with a plumous seta.

The wings are incumbent one on the other. The palpi are strongly dilated superiorly, in the form of a spatula, and somewhat exterior.

These Insects are usually found along the banks of rivers, &c(3).

ARGYRITIS, Lat.

Which, in the short form of the body, strongly flattened and almost semicircular abdomen, short, broad head, and distant wings, resemble the Phasiæ. The antennæ, inserted below the front, are very short, with the last joint a little larger than the penultimate, almost orbicular, and furnished with a simple and geniculate seta, like that of the antennæ of the Goniæ. The palpi terminate in a short, but almost ovoid and pointed club.

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(1) Fab., Syst. Antl.

(2) See Meig., and Wied., Anal. Entom. I know two species, one from the Isle of France and the other from the environs of Paris. We should also refer to this genus the *Musca felina* of Fabricius, which is found in the south of France.

(3) See Lat., Gener., Crust. et Insect., IV, 347; Dej., Fall., and Meigen.

I have established this genus on two species of Diptera sent to me by M. Marcel de Serres, and captured by him in the environs of Montpellier. They are small, and furnished with a silvery down, which, in one, covers the whole abdomen.

Certain species of Tachina, Meig., those, for instance, the type of whose wings is given in fig. 32 of pl. 41, and some of his Anthomyiæ with large alulæ covering the greater portion of the halteres, will re-enter the last division of the Creophilæ.

In all the other Muscides of which we are about to speak, the alulæ are small or almost wanting, the halteres are exposed, and the principal longitudinal nervures of the wings extend to the posterior margin, which, except in a very small number, closes the posterior cells, and even some others that originate near the opposite extremity. The wings, in most of them, are incumbent, one on the other.

A second general division of the Muscides, that of the ANTHOMYZIDES, is composed of species resembling common Flies, in which the wings are most frequently incumbent and do not vibrate, and where the antennæ are inserted near the front, are always shorter than the head, terminated by a linear palette or one forming a long square, longer than the preceding joint, and with the seta most commonly plumous. The head is hemispherical, furnished with hairs anteriorly, and the eyes are closely approximated or contiguous posteriorly in the males. The legs are of an ordinary size, and the abdomen is composed exteriorly of four annuli.

In some, the antennæ are almost as long as the face of the head, and the seta is plumous.

Sometimes the abdomen of both sexes is gradually narrowed, and terminates in a point.

ANTHOMYIA, Meig.—*Musca*, Lin. Fab.

Where the eyes are separated in both sexes; the proboscis does not terminate in the manner of a hook, or by an abrupt and very open angle.

A. pluvialis; Musca pluvialis, L. Cinereous, with black spots on the thorax, and nine triangular ones of the same colour on the abdomen. Very common in France(1).

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(1) See Meigen.

DRYMEIA, Meig.

Where the proboscis presents the above character, and the eyes are contiguous posteriorly in the males(1).

Sometimes the abdomen of these individuals is inflated at the end, and clavate.

CŒNOSIA, Meig.—*Musca*, De Geer.

De Geer has given us the history of a species of this subgenus—*Musca fungorum*, Insect., VI, 89, v, 2—7. Its larva lives in mushrooms, and most commonly in those which are edible. He also observed that these larvæ devour each other, a rare circumstance among Insects of this order(2).

In the others, the antennæ are shorter, and have a simple seta.

The eyes are contiguous posteriorly in the males. The mouth is densely pilose.

ERIPHIA, Meig.(3)

Our third division, that of the HYDROMYZIDES, is characterized as follows: an almost triangular head with very prominent eyes; an inflated, convex snout or muzzle: a little arched lamina bordering the top of the buccal cavity, which is very large; a very thick proboscis, and the sides of the face destitute of setæ. The antennæ are inserted near the front, inclined, and very short, with the seta most commonly plumous. The wings are incumbent, one on the other. The legs are large, with the thighs, at least the anterior ones, inflated in several.

All the species indigenous to France inhabit aquatic localities.

In some, all the thighs, or at least the anterior ones are inflated; the seta of the antennæ is always pilose(4).

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(1) Idem.

(2) See Meigen.

(3) Idem.

(4) The wings also are somewhat different.

ROPALOMERA, Wied.

Where all the thighs are inflated, and the face presents a prominence or tubercle anteriorly(1).

OCHTERA, Lat.—*Musca*, De Geer.—*Tephritis*, Fab.—*Macrochira*, Meig.

Where the two anterior thighs are very large, compressed and dentated beneath, and the tibiæ are arcuated, capable of being flexed on the inferior edge of the thighs, and terminated by a strong spine(2).

The thighs of the other Hydromyzides are not inflated.

EPHYDRA, Fall.

The Ephydræ resemble the Ochteræ in the prominence of their eyes, which project posteriorly beyond the head, and in their thick snout; but the seta of their antennæ is simple, and merely thickened inferiorly; the palette is rounded at the end. There is a little tubercle or prominence ou the posterior part of the vertex(3).

NOTIPHILA, Fall.

Where the head is more rounded, and without any anterior prolongation in the form of a snout; the eyes are less protuberant, and do not project beyond the posterior margin of the head. The seta of the antennæ is plumous; the palette is proportionally more elongated than in Ephydra and less rounded; no tubercle or prominence on the vertex.

We have followed the system of M. Fallen in placing this subgenus here, although we think it would be more proper to arrange it in the ensuing division, near the Heleomyzæ, from which it scarcely differs. The

N. cellaria, Panz., Faun. Insect., Germ., XVII, 24, which deposits its eggs in vessels containing vinous liquors, belongs to this subgenus. We formerly referred it to Mosillus(1).

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(1) Wied., Anal. Entom.

(2) Lat., Gener., Crust. et Insect., IV, 347.

(3) Fall., Dipt., and Wied., Ibid.

The Muscides of the three following divisions have an oblong body; the wings are incumbent and nonvibratile; the head, either rounded or almost spherical, or nearly pyramidal, or bordering on an oval, is plane above, prolonged and narrowed into a point, usually truncated or obtuse at its anterior superior extremity; and the face is covered with a white membrane, furrowed longitudinally on each side. The head is frequently compressed below the antennæ, and its inferior or oral extremity projects in the manner of a truncated snout; in others, the face forms a strongly inclined plane, which is not (or almost not) turned up inferiorly. The antennæ are inserted on the top of the front and sometimes even received in fossulæ, but they most commonly project, are straight and distant, and in several as long as the head, or longer. In all the other Muscides, they are always shorter than the head.

The Muscides of the fourth division, that of the SCATOMYZIDES, as well as those of the fifth, are distinguished from the species of the sixth, by the following characters: the head, viewed from above, is never longer than it is broad, its form being nearly spherical or triangular; the posterior legs are never much longer than the body nor very slender, and the body, though sometimes narrow and elongated, is not filiform.

Here, the Scatomyzides are distinguished from the Muscides of the following division, or the *Dolichocera*, by their antennæ, of which the third joint is evidently longer than the preceding one; with the exception of a single genus, *Loxocera*, they are always shorter than the head. The anterior and superior extremity of this latter part of the body rarely projects beyond the eyes, and when viewed from beneath usually appears almost hemispherical, and rather wider than it is long.

Sometimes the posterior legs are large and distant, their thighs are thick or compressed, and the joints of their tarsi dilated or widened. The antennæ are always very short, with the last joint lenticular or nearly globular, and furnished with a simple seta. The sides of the face are pilose and silky.

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(1) It may perhaps be a *Piophyla*, Fall., a genus in which is placed the *M. casei*, L., whose body is very black and glossy; epistoma, front and legs, fulvous; anterior legs and posterior thighs with a black ring.

THYREOPHORA; Lat. Meig.—*Musca*, Panz.

Where the antennæ are received into a sub-frontal cavity, with a lenticular, but not transverse, palette; the head gradually inclines from its summit to the mouth; the posterior thighs are thick, and the second and following joints of the tarsi are almost similar.

All the terminal cells of the wings are closed by their posterior edge. The palpi are much widened at the end in the manner of a spatula.

T. cynophila, Panz., Faun. Insect. Germ, XXXIV, 32. Deep blue; head reddish-yellow; two black points on each wing; scutellum terminated by two spines. Found on dead dogs, and always in autumn. According to an observation communicated to me by one of our most learned and zealous entomologists, M. Percheron, Jun. this Insect is sometimes phosphorescent, a peculiarity that struck one of his friends who witnessed it in his chamber at night, and induced him to capture it(1).

SPHÆROCERA, Lat.—*Borborus*, Meig.—*Copromyza*, Fall.

Where the antennæ are salient, with the palette almost hemispherical and transversal; the head is abruptly concave below the front and turned up near the oral cavity, of which the superior extremity is bordered; the posterior thighs are compressed, and the two first joints of their tarsi are evidently wider than the following ones.

The second cell of the posterior extremity of the wing—the last of those which occupy the middle of their length—is closed before the posterior edge. The proboscis is very thick, and the body is depressed.

These Diptera are almost always found in the vicinity of dunghills, which is most probably the abode of their larvæ(2).

Sometimes the posterior legs scarcely differ from the others. The antennæ of several are almost as long as the face of the head, and their seta is frequently pilose. The sides of the face are occasionally glabrous.

In some, the antennæ are almost as long as the face, inclined, generally approximated, and terminated by a narrow and elongated palette, with the seta always pilose. The abdomen, at least that of the male, is elongated, almost cylindrical, terminated by a club in some, and a stilet in others.

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(1) Lat., Gener. Crust. et Insect., IV, 358; and Meigen.

(2) Lat., Ibid., IV, 359; Wied., Anal. Entom., under the name of *Copromyza*.

In these, the sides of the face are furnished with hairs or mustachios.

Here, the abdomen presents externally but four segments. The seta of the antennæ is simple.

DIALYTA, Meig.(1)

There, it offers five rings at least.

CORDYLURA, Fall. Meig.—*Ocyptera*, Fab.

Where the wings extend but little, or not all, beyond the abdomen, which terminates in a club in the males(2).

SCATOPHAGA, Lat. Meig.—*Musca*, Lin. Fab.

Where the wings are much longer, and the abdomen is not inflated at the posterior extremity in either sex.

> *S. stercoraria; Musca stercoraria*, L.; Reaum., Insect., IV, xxviii. Densely pilose and of a greyish-yellow; front russet; a brown point on the wings; seta of the palette bearded. Very common on fæcal matters, those of man particularly, where the female deposits her eggs which are retained on the surface by two appendages resembling little wings(3).

These are destitute of mustachios.

The body is always long, narrow, cylindrical, and linear.

LOXOCERA, Lat. Fab. Meig.

Where the antennæ are much longer than the head. The Loxoceræ resemble little Ichneumons(4).

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(1) See Meigen.
(2) Idem.
(3) Meig., and Lat., Gener. Crust. et Insect., IV, 358.
(4) Lat., Fab., Meigen.

Chyliza, Fall. Meig.

Where they are rather shorter than the head, with the seta thick, and in the form of a stilet(1).

The antennæ of the others are always much shorter than the head, and usually projecting and distant; the palette, never much longer than it is wide, is sometimes almost ovoid, or bordering on an oval, and sometimes nearly globular.

Some, in which the seta of the antennæ is usually pilose, have the narrow and elongated body of the preceding ones; the abdomen of several also terminates in a point or stilet.

Of these Muscides, some have a naked face, and the palette of their antennæ more or less ovoid or oval.

Such are the two following subgenera:

Lissa, Meig.

Where the top of the head presents a prominence, and the almost linear abdomen is not terminated by an articulated stilet(2).

Psilomyia, Lat.—*Psila*, Meig.

Where the body is proportionally less elongated and cylindrical, and the abdomen of the females terminates in an articulated stilet(3).

To this subgenus may be united the *Geomyzæ* of Fallen(4).

The *Tetanura* and *Tanypeza* of M. Meigen appear to approach the preceding subgenera. In both, however, the legs seem to be proportionally longer and more slender. The abdomen of the Tetanuræ is obtuse and thickened at the end.

The first exterior nervure of the wings is simple, and does not produce a stigmatiform cell; the exterior terminal cells are distant(5).

The abdomen of the female Tanypeza is terminated by a point or stilet. The first terminal cell, that which comes after the cubital, is almost closed at the end, or forms a narrow, elongated, and truncated triangle. I suspect that this subgenus belongs to the division of the *Dolichopoda*(1).

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(1) Meigen.

(2) Meigen.

(3) See Meigen. I have changed the name of *Psila*, because it too nearly resembles that already given to a genus of the Hemiptera.

(4) Fall., Dipt.

(5) Meigen.

In others, the sides of the face are furnished with hairs; the first joint of their antennæ is much more slender than the following ones, almost cylindrical, and somewhat thickened at the end; the two following ones form a small rounded club.

LONCHOPTERA, Meig.—*Dipsa*, Fall.

Where the ocelli are placed on an eminence. The wings are long and exhibit no transverse nervure beyond their base; the third longitudinal nervure, from the exterior margin, is bifurcated. This subgenus is far removed from the Dolichopoda, near which Meigen has placed it(2).

The body of the other Scatomyzides is thicker and less oblong, approaching more to the form of that of the common Fly.

One single subgenus, or the

HELEOMYZA, Fall.,

Presents mustachios(3).

Two other subgenera are removed from the last of the division by the pilose or plumous setæ of their antennæ.

DRYOMYZA, Fall. Meig.

Where the face is concave beneath the antennæ, and terminates inferiorly, or at the oral cavity, by a short, truncated snout, as in Scatophaga, and in most of the Dolichocera(1).

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(1) Idem. For the genus *Tetanops*, which in some respects seems to belong to this division, see that of the Carpophila.

(2) See Meigen.

(3) Fall., Dipt.: the *Mouche des latrines* (*Musca serrata*, L.) of De Geer, which is referred by Fallen to this subgenus, differs from the other species in the seta of the antennæ, which is simple. The palette also is larger and more orbicular. This Insect, which has a cinereous body with a fulvous abdomen, is very common in the interior of our houses. The setæ and dentations of the exterior margin of the wings form no peculiar character—it is common to several other Scatomyzides. The *Mouche bossue* of De Geer—Insect., VI, ii, 5—quoted in the first edition of this work, whose larva, that feeds on Aphides, has two horns posteriorly, is not an Oscina, but rather a Heleomyza.

SAPROMYZA, Fall. Meig.

Where the face is straight, and does not project inferiorly(2).

The last of the Scatomyzides have the seta of the antennæ simple(3); these organs are always very short, distant, and straight, with the last joint semi-ovoid or forming a short triangle obtuse at the end. These Insects are very small, almost glabrous, black or cinereous, and more or less varied with yellow; the legs are strong and the eyes large. The summit of the head is flat and frequently presents, at its posterior extremity, a triangular brown space, on which are placed the ocelli. The two ordinary transverse nervures of the wings are approximated near the middle. These Diptera are found on flowers.

Several of the larvæ attack the interior of different plants, and some of them are very injurious to the agriculturist by destroying various cerealia previous to their fructification. Those of one species—*Musca frit.*, L.—in Sweden sometimes destroy the tenth of the crop of barley, the total loss thereby occasioned being estimated at one hundred thousand golden ducats. The larvæ of some other species—the *Oscina pumilionis*, and *O. lineata*, Fab.—are also highly noxious. For further details on those Insects which attack our cerealia, see the Memoir of the late M. Olivier(4).

These Scatomyzides compose our genus

OSCINIS, Lat. Fab.

To which we refer the *Chlorops* of Meigen. A species that I have received from Germany under the name of *brevipennis*, might however form a separate subgenus on account of the seta of its antennæ, which is thick, almost in the form of a stilet, and geniculate. The anterior and superior extremity of the head is sometimes truncated, and sometimes pointed. Another dipterous Insect which was also sent to me from Germany, and marked *Piophila vulgaris*(1) is in the same case as the first, but does not appear to me to be sufficiently removed from the Oscini(2).

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(1) Meigen.

(2) Meigen.

(3) It is thickened at its base.

(4) Certain species in which the seta of the antennæ is plumous, and referred by him to the genus *Tephritis*, are perhaps Sapromyzæ.

The fifth division, that of the DOLICHOCERA, and which embraces the genus called *Tetanocera* by M. Duméril, closely approaches the fourth; but the length of the second joint of the antennæ which is here equal to that of the third, or the palette, and most frequently surpasses it, serves to distinguish them. These organs, always distant and projecting, are, with but few exceptions, as long as the head or longer, and terminated in a point. The superior plane of the head forms an obtuse triangle, or one truncated at the apex. The face is smooth or but slightly silky.

In some the antennæ are shorter than the head.

OTITES, Lat.

Where the seta of the antennæ is simple and the inferior extremity of the head, or its oral portion, does not project(3).

EUTHYCERA, Lat.

Where the second joint of the antennæ is larger than the following one, almost square, and the latter is triangular and pointed, with a plumous seta. The inferior extremity of the head projects in the manner of a truncated snout(1).

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(1) The *P. scutellaris* of Fallen and Meigen. The face is but very slightly silky. The top of the head and thorax is pilose in the Heleomyzæ, a subgenus that is easily confounded with the preceding one. In Oscinis or Piophila and Chlorops, the summit of the head, as we have already stated, presents posteriorly a triangular space, sometimes even slightly prominent, and usually brown and glossy, on which the ocelli are situated. The antennæ are always distant, and the seta is simple. The body alone is pubescent. The legs are proportionally more robust than those of the Heleomyzæ, and it is evident that these Insects approach the Tetanocera. Messrs Fallen and Meigen have not sufficiently compared the characters of the genera they have established, nor endeavoured to approximate them in a natural series, which makes it a difficult matter to discern the difference between several of them. I have frequently been embarrassed with genera, from which I could have been relieved by the work of the latter, but it is not yet published.

(2) See the Nouv. Dict. d'Hist. Nat. 2d edit., article *Oscine*, divis. II, and Lat., Gener. Crust. et Insect., IV., 361; *Oscinis lineata*, and the following species. See also with respect to *Piophila*, Fallen, Meigen, and Wiedemann—Analect. Entom.

(3) Lat., Hist. Nat. des Crust. et des Insect.; the second edition of the Nouv. Dict. d'Hist. Nat., article *Oscine*, divis. I; and Lat., Gener. Crust. et Insect., IV, 351; to this subgenus I also refer the *Oscinis umbraculata*, Fab.

The antennæ of the others are manifestly as long as the head or longer.

SEPEDON, Lat.—*Baccha*, Fab.

Where the antennæ are considerably longer than the head, with the second joint much longer than the last and cylindrical; the latter forms an elongated, pointed triangle furnished with simple setæ(2).

TETANOCERA, Dum. Lat.—*Scatophaga*, Fab.

Where the antennæ are as long as the head, or a little longer, with their second joint compressed, forming a long and narrow square, as long as the third, or only a little longer; the third joint is similar to that of the preceding subgenus, but the seta is sometimes plumous(3).

The sixth division, that of the LEPTOPODITES, is remarkable for the length and tenuity of the legs, the two last being at least twice the length of the body, which is also slender and filiform; the two first are distant from the others; all the tarsi are short. The head is spherical or ellipsoidal, and terminates in a point; its length equals or surpasses its transverse diameter. The termination of the abdomen is pointed in the females, and clavate in the males. The antennæ are very small, and are inserted on the front. These Muscides are found on plants, and several frequent aquatic localities. In the

MICROPEZA, Meig.

Which I formerly distinguished by the name of *Calobates*, the head is ellipsoidal and terminates in a point; the last joint of the antennæ semi-orbicular, and the seta simple. The space which separates the anterior legs from the others, is more apparent here than in the following subgenus.

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(1) *Scatophaga chærophylli*, Fab.; and some species of Tetanocera.

(2) Lat., Gener. Crust. et Insect., IV, 349.

(3) Lat., Gener. Crust. et Insect., IV, 349. This subgenus should be re-examined. Some of the species may be referred to Sepedon—*S. rufa, rufipes*, Fab.—and others will form separate subgenera. Some of them are connected with Oscinis and Dryomyza.

M. filiformis; Calobata filiformis, Fab.; Schell., Dipt., VI, 1. Blackish; abdominal annuli margined above with whitish; legs fulvous, with a black ring round the posterior thighs. In the woods about Paris. To this species M. Meigen refers the *Musca corrigiolata* of Linnæus, which is also a Fabrician *Calobata*(1).

In

Calobata, Meig. Fab.

Or my *Micropeza*, the head is spheroidal, and the last joint of the antennæ, more elongated than in the preceding subgenus, is almost triangular and rounded at the end; the seta is frequently plumous(2).

Our seventh division of the Muscides, that of the Carpomyzæ, so called because the larvæ of several species feed on fruits and seeds, in the germ of which the mother had deposited her eggs, is characterized as follows: wings turned up or distant when at rest, and susceptible in that state of a reiterated vibratile motion, or of being alternately raised and depressed, and spotted or dotted with black or yellowish; a port generally analogous to that of the common Fly; but the eyes are always distant, and the halteres exposed; the abdomen exhibits from four to five rings exteriorly, and frequently terminates, in the females, in a hard, cylindrical, or conical point, which acts as an ovipositor; the antennæ are always short, en palette, and their seta is rarely pilose.

Several species approach those of the last subgenera in the narrow and elongated form of their body, the length of their legs, their head more globular or elongated than in the other Carpomyzæ, where its form is hemispherical. These elongated species constitute three subgenera(3).

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(1) Lat., Ibid., 352; Meig., Dipt. According to the figure, given by M. Wiedemann, of a species of *Nerius* (*fuscus*, Anal. Entom., 1), Fab., these Insects must have a general resemblance to the Micropezæ, but are removed from them by their antennæ, almost as long as the head, of which the second joint is at least as long as the third; the latter is almost orbicular, a little longer than it is wide. It is evident then, that this genus is connected with Tetanocera, just as the Calobatæ of Meigen lead to *Sepsis*, which I had united to the preceding ones under the common name of Micropeza. Here the wings are vibratile, which leads us to the *Cephalia*, *Ortalis* and *Trypeta* of Meigen, that present the same characters.

(2) See Meigen.

(3) According to Meigen, two of these subgenera, *Cephalia* and *Sepsis*, have but four apparent abdominal annuli, whilst the following subgenera, Platysoma excepted, exhibit five.

Diopsis, Lin. Fab.

Also called *Mouches à lunettes*, on account of their eyes being placed at the extremity of two lateral, distant, and cylindrical prolongations of the head; the antennæ are inserted beneath. The scutellum is terminated by two spines. These singular Diptera, of which M. Dalman has given us a good Monograph—Anal. Entom. I—are foreign to Europe.

But few species are known; one of them is red with a black thorax, and a spot of the latter colour at the extremity of the wings; it is found in Guinea and Senegal. I have received a specimen of this species from the liberality of my friend Count Tousselin, who obtained it from Senegal. M. Dalman, who describes five of them, calls it *apicalis*.

Cephalia, Meig.

Where the palette of the antennæ is narrow, elongated, and almost linear, with a pubescent seta; the fore-part of the head is considerably prolonged and without setæ; the palpi are strongly dilated in the manner of a spatula(1).

Sepsis, Fall. Meig.—*Tephritis*, Fab.—*Micropeza*, Lat.

Where that palette is much shorter and semi-elliptical, and has a simple seta; the anterior part of the head projects but little and is covered with setæ; the palpi are almost filiform, and simply and gradually increase in thickness.

S. cynipsea; Musca cynipsea, L. Very small; cupreous-black and glossy; head black; coxæ and anterior legs fulvous; a black point near the extremity of the wings. It diffuses a strong odour of Balm and is found in great numbers on leaves and flowers; its wings are constantly but slowly vibrating(2).

The other Capromyzæ have the port of common Flies, a short hemispherical head, triangular or conical abdomen and moderate legs.

Sometimes the superior plane of the head is almost horizontal or slightly inclined, so that the antennæ, when viewed in profile, appear to be inserted almost on a level with that plane or near the front. The palpi and the proboscis are retracted within the oral cavity. The wings are turned up when at rest, and the abdomen exhibits five annuli exteriorly.

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(1) Meig., Dipt., XLVII, 10—16. See the genus *Calobata*, Fab.

(2) For the other species, see Meigen.

ORTALIS, Fall.—*Scatophaga, Tephritis, Dictya*, Fab.—*Tephritis*, Lat.

Where the abdomen is not terminated in the females by an always external prolongation, in the form of a tail or stilet, serving as an ovipositor(1).

The body of several species is somewhat more elongated than in the following subgenus, and these Diptera, in this respect, are intermediate between the latter and the preceding ones.

The palette of the antennæ is sometimes long and linear as in the *O. paludum*, Fall.; and sometimes short and wide as in the *O. vibrans*—*Musca vibrans*, Lin.—De Geer, Insect., VI, 1, 19, 20, the body of which is black, and the head red, with a white streak on the inner margin of each eye; a black spot may be observed at the extremity of the wings, and the first exterior nervure of their base becomes thickened where it unites with the edge, presenting the appearance of a black stigma.

To this subgenus M. Fallen refers the *Musca cerasi*, L., or the one whose larva feeds more particularly on the red and white-heart cherry; when about to become a pupa, it leaves the fruit and enters the ground where its metamorphosis is completed. The perfect Insect is very black and glossy, with four transverse blackish bands on the wings united by pairs in opposite directions(2).

TETANOPS, Meig.

Where the abdomen of the females terminates by an always projecting, tubular oviduct, resembling a tail; the head seen from above appears to be almost triangular, and as long as it is wide(3).

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(1) According to Meigen the hypostoma is arched or rather carinated in the middle, whilst it is plane in Trypeta. But this carina, although smaller, appears to me to exist in several species of the last genus.

(2) See Meigen.

(3) Idem. A subgenus approximating to those of the Dolichocera in the pyramidal form of the head, and to the Tephrites in their other characters, particularly in the abdomen which is terminated in a truncated tube.

TEPHRITIS, Lat. Fab. Fall.—*Trypeta*, Meig.—*Dacus*, Fab.

Where the abdomen is similarly terminated; but the head, seen from above, is rather transversal than longitudinal, and rounded.

The species in which the palette is more elongated, form the genus *Dacus* of Fabricius. Of this number is the one that usually attacks the Olive, which he however places among his Oscini. It is reddish, with the top of the thorax, some streaks on the back and scutellum excepted, blackish; the sides of the superior part of the abdomen are also spotted with blackish. The scutellum is salient. Coquebert has figured it in his Illust. Icon. des Insect. XXIV, 16.

T. cardui; *Musca cardui*, L.; Réaum., Insect. III, xlv, 12—14. Black; head and legs fulvous-brown; a zigzag brown line on the wings. The female perforates the stem of the Carduus hæmorrhoidalis, in order to deposit her eggs there, and a gall-like excrescence soon forms, which serves for food and shelter to the larvæ.

The inhabitants of the Isle of France can scarcely obtain perfectly sound and ripe lemons, on the account of the abundance of a dipterous Insect of the same genus, which deposits its eggs in them(1).

Sometimes the head is most compressed transversely, so that its superior plane is more inclined than in the preceding species, and the antennæ, when viewed in profile, appear to be inserted near the middle of the face. The proboscis is very thick and partly salient. The wings are separated horizontally, and the abdomen presents exteriorly but four segments.

PLATYSTOMA, Meig.—*Dictya*, Fab.(2)

This last subgenus manifestly leads us to the *Timiæ* of Wiedemann, closely approximated itself to our *Mosillus* and *Lauxania*, and to some other subgenera of M. Meigen.

They will close our eighth division, that of the GYMNOMYZIDES. These Muscides are small, with a short, thick, arcuated and almost glabrous body of a glossy-black colour. Their head is strongly compressed transversely, like that of the Platystomæ, is of a uniform colour, generally that of the body, without any projection inferiorly, and with a large oval aperture. The wings are incumbent on the body, and extend beyond it posteriorly; the scutellum projects; the abdomen is depressed, short, and terminated in some by a little point in the form of a stilet; the legs are almost glabrous or but scarcely pilose.

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(1) See Meigen.
(2) Idem.

In some, the antennæ are almost as long as the head, and distant.

CELYPHUS, Dalm.

Easily distinguished from all other Diptera by the scutellum, which covers the whole back of the abdomen, as in Scutellera.

C. obtectus, Dalm., Anal. Entom. The only species known. From Java.

LAUXANIA, Lat. Fab. Meig.

Where the scutellum is of an ordinary size, and the antennæ have a plumous seta(1).

The others have antennæ shorter than the head.

Here, they are always very short, inserted beneath a sort of arch that traverses the face, and very distant; the first cell of the posterior edge of the wings, or that which directly follows the cubital, is most frequently closed. The antennæ are lodged in fossulæ, and the space between them is elevated. The front is frequently punctured.

Those species, in which the first cell of the posterior edge is almost closed, form, in the system of Meigen, two genera. His Timiæ (*Timia*), in which, according to him, the abdomen exhibits six annuli, and the palette of the antennæ is short and almost semi-ovoid; and his Ulidiæ (*Ulidia*), where it is more elongated, almost elliptical, and where the abdomen presents but five rings. M. Fallen had designated this last genus by the name of *Chrysomyza*. We will unite these two genera in the single subgenus

MOSILLUS, Lat.

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(1) Lat. Gener. Crust. et Insect., IV, 357; Fab., and Meigen. The latter unites some species with it, in which the antennæ are shorter, that might form a separate subgenus.

I have often found numbers of the *M. arcuatus* on the dust of old walls(1).

Those species, in which the first cells of the posterior edge of the wings are entirely open and longitudinal, composed, in the work of Meigen, two other genera:

Homalura, where the abdomen presents five segments, and Actora, where it exhibits six. The head is still more compressed than in the preceding subgenera. The seta, according to him, is naked, but I have seen it plumous in some specimens(2).

There, the antennæ are almost contiguous; the cells of the posterior edge of the wings are always open.

Those Gymnomyzides in which the antennæ are very short, and inserted, as in the last subgenus, under a sort of arch and near the middle of the face, form the genus Gymnomyza of Fallen(3). Those in which these organs are inserted higher up, without any distinct appearance of an arch at their origin, and that terminate in an elongated palette, compose the genus Lonchæa of Fallen and Meigen. According to the latter the front is narrower in the males than in the females, and we see by their character that these Insects are connected in some respects with various species of Anthomyzæ(4). The antennæ of the Celyphi and Lauxaniæ are also inserted higher than in the other Gymnomyzæ.

Our second section of the Muscides, which will form our ninth and last sub-tribe or general division, that of the Hypocera, comprises but a single subgenus, very distinct from the preceding ones in several characters. The palpi are always exterior; the antennæ inserted near the oral cavity are very short, and terminated by a thick and almost globular joint, with a very long seta. The wings, whose edge is densely ciliate superiorly, present near the base a stout oblique nervure, which extends to the margin where this stigma is placed in the Hymenoptera, and from this nervure proceed three others which run almost parallel with each other, in a longitudinal direction; hence the origin of the name *Trineura*, given to this subgenus by M. Meigen. The body is arcuated, the legs stout and spinous, and their thighs large and compressed, the posterior ones particularly. These Insects are extremely vivacious, and form in our "Genera" the genus

Phora, Lat.—*Trineura*, Meig.

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(1) See Lat., Gen. Crust. et Insect, IV, 357; Meig., and Fallen.

(2) See Meigen.

(3) Fallen, Dipt.

(4) Fall. and Meigen.

In the Diptera of which we have hitherto spoken, we have found a sucker received into the superior canal of a tubular sheath, more or less membranous, geniculate at base, most frequently terminated by two lips, and accompanied by palpi. The antennæ, except in the last subgenus or *Phora*, have always appeared to be inserted near the front. The larvæ of these Dîptera, although susceptible of being hatched in the venter of the mother, live abroad and feed on various substances, vegetable or animal. These Insects have formed our first general section which is divided into five families. Those of the second differ in all these respects and in some others that are less general, and this dissimilarity has even induced Doctor Leach to form the latter into a particular order, or that of OMALOPTERA. Those which terminate it, and which are destitute of wings and halteres, have a certain affinity with the Hexapoda and Aptera that compose our order of the Parasita or the genus *Pediculus* of Linnæus.

This second section will form our last family of the Diptera.

FAMILY VI.

PUPIPARA.

These Insects, at least the Hippoboscæ, were distinguished by Reaumur, under the analogous appellation of *Nymphipara*.

Their head, viewed from above, is divided into two distinct areæ or parts. One posterior, and more particularly composing the head, gives origin to the eyes and receives the other part in an anterior emargination. The latter is also divided into two portions, the posterior large and coriaceous, bearing the antennæ on its sides, and the other constituting the apparatus of manducation. The inferior and oral cavity of the head is occupied by a membrane; from its extremity issues a sucker arising from a little bulb or projecting pedicle, composed of two closely approximated threads or setæ, and covered by two coriaceous, narrow, elongated, and pilose laminæ which form its sheath. Whether these laminæ or valvulæ represent (as I presume) the palpi of other Diptera, or whether they be parts of a true sheath, as is the opinion of M. Dufour in speaking of a species of Ornithomyia—Ann. des Sc. Nat., X, 243, XI, 1—where he has discovered two little bodies which he considèrs as palpi(1), it is not less a fact that the proboscis of these Insects evidently differs from that of the preceding Diptera, and that the sheath, in this case, would be more analogous to the proboscis of the Flea, from which however it is removed by the absence of articulations.

The body is short, tolerably broad, flattened and defended by a solid skin almost of the consistence of leather. The head is more intimately united to the thorax than in the preceding families. The antennæ, always situated at the lateral and anterior extremities of the head, sometimes form a tubercle bearing three setæ, and sometimes little hairy laminæ. The eyes vary as to size; in some species they are very small.

M. Leon Dufour, in his description of the *Ornithomyie bilobee*, has observed that although this genus has had ocelli attributed to it, he has not been able to discover them. A fresh examination of such species as I could procure has in fact convinced me that we were mistaken(2), and it may be considered as a general rule that the Pupipara are destitute of those organs. The thorax presents four stigmata, two anterior and two posterior. The learned entomologist just referred to, in the *Hippobosca equina* of which he has described the Anatomy—Ann. des Sc. Nat., VI, 299, et seq.—could only find the two first, those which are situated on the lateral and anterior extremities of the mesothorax; but I have discovered the two others in the same Insect. They are situated, as in other Diptera, near the origin of the halteres. The abdomen of the *Hippobosca ovina*—see *Melophagus*—presents ten, in the form of little round, corneous, umbilicated tubercles, the four last being approximated to the anus. Those of the thorax, always four, are very apparent. According to the same observer the interior of this part of the body in the *H. equina* presents both utricular and tubular tracheæ; but those of the abdomen are all of the latter description and very numerous.

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(1) In the Melophagi, the base of the laminæ of the sucker is covered by two little coriaceous, triangular and united pieces, forming a sort of labrum. They seem to form a miniature representation of the two pieces that cover the base of the proboscis of the Flea.

(2) Dr Leach, however, admits that they exist in certain species.

The wings are always distant and accompanied by halteres. Their edge is more or less fringed with cilia. The superior nervures which are in its vicinity are strong and very distinct; but those which then extend to the posterior margin are but slightly marked and are not united transversely. In the last Diptera of this family, these organs are wanting or are merely rudimental. The halteres also disappear. The legs are very distant and terminated by two robust nails with one or two teeth beneath, which makes them appear double or triple. The skin of the abdomen is formed of a continuous membrane, so that this part of the body is susceptible of being distended and of acquiring a considerable volume, as necessarily happens in those female Hippoboscæ, where the larvæ are hatched and continue to reside until the period of their transformation into pupæ. At this epoch the larvæ issue from the venter of the mother in the form of a soft, white egg, almost as bulky as the maternal abdomen; the skin hardens and becomes a firm shell, at first brown, then black, round, and frequently emarginated at one end, and presenting a glossy plate or operculum which is finally detached in the manner of a cap to allow the egress of the perfect Insect. This shell has no annuli or transverse incisures, a character which distinguishes it from the other pupæ of Diptera, and from those of the Athericera particularly, to which it approximates the most.

It is to the splendid Memoirs relative to these Insects by Reaumur, De Geer, and M. Leon Dufour, all accompanied by detailed figures, that we must recur, in order to obtain a profound knowledge of these transformations, and an explanation of the changes which take place in the female at the moment of depositing her larvæ. The latter, in particular, has surpassed his predecessors by anatomical investigations which have unveiled some highly interesting and curious facts, such as the existence of salivary glands, of a sort of matrix(1) consisting of a large, musculo-membranous pouch adapted for gestation and analogous to the uterus of woman, and of ovaries entirely different from those of other Insects. These ovaries consist of two obtuse, ovoid bodies filled with a white homogeneous pulp, free and rounded at one extremity and terminating at the other in a peculiar duct. According to this anatomist these ovaries closely approximate to those of woman in their form and position; Reaumur had a glimpse of them. The matrix, which at first is very small, by the progress of gestation becomes enormously dilated, pushes back the viscera, and finally invades the whole cavity of the abdomen, which is thus rendered very large. The memoir of this able observer presents other interesting facts, which, as they differ but little, if at all, from the ordinary laws, we shall not stop to analyze.

These Insects, which have been called by some authors *Mouches-Araignees*, live exclusively on Quadrupeds or Birds, run very fast, and frequently sideways.

Some—*Coriaces*, Lat.—(2) have a very distinct head articulated with the anterior extremity of the thorax. They form the genus

HIPPOBOSCA, Lin. Fab.

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(1) Professor Nitzsch, who in his Memoir on Epizoic Insects treats of various genera of Pupipara, mentions two ovaries and four biliary vessels in Hippobosca, but he neither alludes to this matrix nor to the salivary glands.

(2) Doctor Leach has published a Monograph of these Insects, enriched with excellent figures, beautifully engraved.

HIPPOBOSCA, proper.

Furnished with wings; very distinct eyes occupying all the sides of the head; antennæ in the form of tubercles, with three setæ on the back.

H. equina, L.; De Geer, Insect., VI, xvi, 1—20. Brown mixed with yellowish. Found on Horses and Oxen, usually under their tail and near the anus(1).

ORNITHOMYIA, Lat.

Only differing from Hippobosca in the antennæ which project, are laminiform and pilose; and in the wings which are furnished posteriorly with strongly marked longitudinal nervures that extend to the posterior margin.

These Insects, in the Monograph of the Diptera published by Dr Leach, form four genera. 1. FERONIA—*Nirmomyia*, Nitzsch—distinguished from the following ones by the tubercular form of the antennæ, and by the nails of the tarsi having but two teeth in lieu of three. 2. ORNITHOMYIA, in which, as in the three following subgenera, there are ocelli and tridentated nails, and, as in the two which succeed, laminiform antennæ, but where the wings are almost equally wide and rounded. 3. STENEPTERYX, similar to Feronia, with the exception of the wings which are narrow and very acute. 4. OXYPTERUM, where the wings are equally acute; but the antennæ are dentiform, the eyes are small, and the ocelli are wanting as in Hippohosca and Feronia.

They live on various birds, such as the Swallows, Titmouse, and even on the Vulture.

O. verte; Hippobosca avicularia, L.; De Geer, Insect., VI, xvi, 21—24. Green; top of the thorax black; proboscis projecting; wings almost oval. On the Sparrow, &c.(2)

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(1) See Lat., Gen. Crust. et Insect., IV, p. 362; Leach, Dufour, &c.

(2) Lat., Ibid.; Encyc. Méthod., article *Ornithomyie*, Leach. The eyes of the Ornithomyiæ appear to me to be somewhat smaller than in Hippobosca. The sides of the thorax terminate anteriorly in a point. The sucker originates from a little piece emarginated like a heart, which is not exposed in Hippobosca.

STREBLA, Dalm.

Differing from Ornithomyia in the wings, which are crossed on the body, and of which some of the longitudinal nervures are united by small transversal ones. The eyes are very small and situated on the posterior angles of the head. On a Bat of South America(1).

MELOPHAGUS.—*Melophila*, Nitz.

Destitute of wings, and where the eyes are rather indistinct.

M. vulgaris; Hippobosca ovina, L.; Panz., Faun. Insect. Germ., LXI, 14. Reddish. It conceals itself in the wool on Sheep. Another species is found on the Stag(2).

A species of Melophagus that lives on the Stag, that presents rudiments of wings, and whose thorax is rather wider than the head, forms the subgenus LIPOTENA of Professor Nitzsch. Near the Melophagi should probably be placed his genus BRAULA—Germ. Magas. der Entom.—of which the only known species lives on the domestic Bee. It is figured by M. Germar, Faun. Insect. Eur., VI, 25, and is entirely blind. Its thorax is divided into two transversal portions. The underpart of the last joint of the tarsi is furnished with a transverse range of spines forming a comb. Long before this, Réaumur had observed an analogous parasitical animal (if it be not the same), provided with a proboscis, on the Bee. He has figured it in his Memoirs, V, pl. xxxviii, fig. 1—4.

The head of the other Pupipara—*Phthiromyies*, Lat.—is very small or almost wanting. It forms a minute, vertical body near the anterior and dorsal extremity of the thorax.

They constitute the genus

NYCTERIBIA, Lat.—*Phthiridium*, Herm.

These Insects have neither wings nor halteres, and resemble spiders still more than the preceding ones. They live on Bats. Linnæus arranged one species, and the only one he knew, with the Pediculi(1).

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(1) Dalm., Anal. Entom.

(2) Lat., Ibid., and Leach.

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(1) Lat., Ibid.; and the Encyc. Méthod., article *Nyctéribie*, and the same article of the Nouv. Dict. d'Hist. Nat., 2d edition. See also the Memoir of Professor Nitzsch on Epizoic Insects.

FOURTH GREAT DIVISION OF THE ANIMAL KINGDOM.

ANIMALIA RADIATA.

The Radiated Animals, Zoophyta, or Zoophytes(1), as they are termed, include a number of beings whose organization, always evidently more simple than that of the three preceding divisions, also presents a greater variety of degrees than is observed in either of them, and seems to agree in but one point, viz. their parts are arranged round an axis and on one or several radii, or on one or several lines extending from one pole to the other. Even the Entozoa or Intestinal Worms have at least two tendinous lines, or two nervous threads proceeding from a collar round the mouth, and several of them have four suckers situated round a probosciform elevation. In a word, notwithstanding some irregularities, and some very few exceptions—those of the Planaria and most of the Infusoria—traces of the radiating form are always to be found, which are strongly marked in the greater number, and particularly in Asterias, Echinus, the Acalepha, and the innumerable host of the Polypi.

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(1) Neither of these denominations should be construed literally. There are some genera in this division in which the radiation is but slightly marked or even totally wanting, and it is only among the Polypi that we find that constancy and form of flowers which has caused them to receive the name of Zoophytes. These appellations, however, indicate our having reached the lowest part of the animal series, and that we have arrived at beings, most of which remind us more or less of the vegetable kingdom, even in their external forms—it is in this sense that I employ them.

[We here return to the Baron; the portion of the work written by M. Latreille, which commenced with the Crustacea, or our third volume, having terminated with the Dipterous Insects. *Am. Ed.*]

The nervous system is never very evident, and when traces of it have been apparently visible, it was also arranged in radii; most frequently, however, there is no appearance of it whatever.

There is never any true circulating system. The Holothuria are provided with a double vascular apparatus, one portion of it being attached to the intestines and corresponding to the organs of respiration, and the other merely serving to inflate the organs which supply the want of feet. The latter is only distinctly visible in Ursinus and Asterias. Through the gelatinous substance of the Medusæ we can see more or less complicated canals arising from the intestinal cavity; all this precludes the possibility of a general circulation, and in the great number of Zoophytes it is easily proved that there are no vessels whatever.

In some genera, such as Holothuria, Ursinus, and in several of the Entozoa, we observe a mouth and anus, with a distinct intestinal canal. Others have an intestinal sac, but with a single opening serving both for a mouth and anus. In the greater number there is merely a cavity excavated in the substance of the body which sometimes opens by several suckers; and finally there are some in which there is no mouth visible, and which can only be nourished by porous absorption.

The sexes of several of the Entozoa or Intestinal Worms can be distinguished. The greater number of the other Radiata are hermaphroditical and oviparous; some have no genital organs, and are reproduced by buds or division.

The compound animals, of which we have already seen some examples in the last of the Mollusca, are greatly multiplied in certain orders of the Radiata, and their aggregation produces trunks and expansions forming all sorts of figures. It is to this circumstance, together with the simple nature of the organization in most of the species, and the radiating disposition of their organs which reminds us of the petals of flowers, that they owe their name of *Zoophytes* or *Animal-plants*, by which we merely mean to express this apparent affinity, for as Zoophytes enjoy the sense of touch and the power of voluntary motion, mostly feed on matters which they have swallowed or sucked, and digest them in an internal cavity, they are certainly animals in every point of view.

The greater or less degree of complication in Zoophytes has occasioned their division into classes; but as all the parts of their organization are not yet well known, those sections cannot be characterized with as much precision as those of the preceding divisions.

In Asterias and Ursinus, called ECHINODERMES by Brugiere on account of their spines, we find a distinct intestine floating in a large cavity, and accompanied by other organs, for generation, respiration, and a partial circulation. The Holothoriæ were necessarily united to them on account of the analogy of their internal organization, which is perhaps still more complex, although they have no movable spines on the skin.

The ENTOZOA or Intestinal Worms, which form the second class, have no very evident vessels in which a distinct circulation is carried on, nor separate organs of respiration. Their body is usually elongated or depressed, and their organs arranged longitudinally. The difference in their system of digestion will hereafter probably cause them to be divided into two classes, a circumstance already indicated by our establishing two orders. In some we find an alimentary canal suspended in a true abdominal cavity, which is wanting in the others.

The third class comprises the ACALEPHA or Sea Nettles. They have neither true circulating vessels nor organs of respiration. Their form is usually circular and radiating, and their mouth is almost always their anus. They only differ from Polypi in the greater development of the tissue of their organs. The Acalepha Hydrostatica, which we place at the end of this class, when better known, will perhaps form a separate one; as yet however we only conjecture the functions of their singular organs.

The POLYPI, which compose the fourth class, are those little gelatinous animals whose mouth surrounded with tentacula leads to a stomach sometimes simple and sometimes followed by intestines in the form of vessels. To this class belong those innumerable compound animals with a fixed and solid stem which were considered as marine plants.

The Thethyiæ and Sponges are usually placed at the end of this class, although Polypi have not yet been discovered in them.

The INFUSORIA, or the fifth and last class of the Zoophyta, are those minute beings whose existence we have only discovered by means of the microscope, and which swarm in stagnant waters. Most of them have merely a gelatinous body destitute of viscera, although we commence the series with more compound species possessed of visible organs of locomotion and a stomach: these also may hereafter constitute a separate class.

CLASS I.

ECHINODERMATA(1).

The Echinodermata are the most complicated animals of this division. Invested with a well organized skin, frequently supported by a sort of skeleton, and armed with points, or movable and articulated spines, they have an internal cavity in which distinct and floating viscera may be perceived. A sort of vascular system, which it is true does not extend throughout the body, keeps up a communication with various parts of the intestine, and with the organs of respiration, which are generally very distinct. Threads are also seen in several, which may act as nerves, but which are never arranged with the regularity and fixed order of those in the animals of the two preceding divisions of the Invertebrata.

We divide the Echinodermata into two orders: those furnished with feet or at least with vesicular organs, so called on account of their fulfilling similar functions; and those in which they are wanting.

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(1) The Radaires Echinodermes of M. de Lamarck.

ORDER I.

PEDICELLATA.

The Pedicellata are distinguished by organs of motion exclusively peculiar to them. Their skin is pierced with a number of little holes, arranged in very regular series, through which pass cylindrical and membranous tentacula, each one terminated by a little disk which acts like a cupping-glass. That portion of these tentacula which remains within the body is vesicular; a humour is effused through their entire cavity, and is either propelled at the will of the animal into the exterior and cylindrical portion, which it distends, or returns to the interior vesicle, when the former sinks and becomes relaxed. It is by thus elongating and shortening their hundreds of little feet or tentacula and by fixing them by their cup-like extremities, that these animals effect their progressive motions. Vessels proceeding from these feet extend to trunks which correspond to their ranges, and which terminate near the mouth. They form a system distinct from that of the intestinal vessels observed in some species(1).

Linnæus divided them into three very natural, but numerous genera, and composed of such various species, that they may be considered as forming three families. The

ASTERIAS, Lin.

Or Starfish, have been so called because their body is divided into rays (generally five), in the centre of which, and underneath, is the mouth, that is also the anus.

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(1) For details respecting the organization of the Star-fish, Ursini and Holothuriæ, see the splendid anatomical Monograph of Tiedemann, Landshut, 1816, in folio.

The framework of their body is composed of small osseous pieces, variously combined, the arrangement of which merits examination. Their power of reproduction is very great, as they not only reproduce the rays which have been separately removed, but a single one with the central ray remaining will reproduce all the others; for this reason their figure is frequently irregular. In the

Asterias, Lam.

Or Asterias properly so called, each ray has a longitudinal groove above, the sides of which are perforated by the little holes beforementioned, for the transmission of the feet. The rest of the inferior surface is furnished with small and movable spines. The whole surface is also pierced by pores, which allow a passage to tubes much smaller than the feet, that probably serve to absorb water, and convey it into the general cavity for a sort of respiration. On the middle of the body, and a little on one side, is a stony plate, with a corresponding internal canal, filled with a calcareous matter, which is thought to serve for the growth of the solid parts. Internally we find a large stomach, immediately on the mouth, from which two cæca proceed to each ray, ramifying like trees, and suspended (each) to a sort of mesentery. There are also two ovaries in each ray, and it appears to us that they possess the faculty of self-impregnation. A particular system of vessels is connected with their intestines, and another with their feet.

M. Tiedemann thinks that their nervous system consists in a very fine thread which surrounds the mouth, and sends a branch to each foot, which runs between those organs exteriorly, and gives off two twigs internally.

The osseous framework of each ray consists of a sort of column extending along the inferior surface, and composed of vertebræ articulated with each other, from which proceed the cartilaginous branches that support the exterior envelope. Between the roots of these branches are the holes that transmit the feet. Other osseous pieces, frequently furnished with movable spines, are observed on the lateral edges of the branches in many species.

Some of this genus have the figure of a pentagon with rectilinear sides, rather than that of a star. The radiation is only marked externally by the groove of the feet(1).

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(1) *Asterias discoidea*, Lam., Encyc. Méthod., Vers, XCVII, XCVIII;—*As. tesselata*, var., A, Lam.; Link., XIII, 22; Encyc., XCVI.

In others there is a slight re-entering angle in each side of the pentagon(1).

The sides of some are concave, which approximates them to a stellated figure(2).

In these various species the cæca and the ovaries are not so elongated as in most of those which have their rays elongated and separated by strongly marked re-entering angles. Such are

A. rubens, L.; Encyc., CXIII, 1, 2. Extremely common on the whole coast of France, so much so, that in some districts they are employed to manure the soil.

A. glacialis, L.; Link., XXXVIII, 69; Encyc. CVII and CVIII. This species is frequently more than a foot in diameter. The spines which invest the superior part of its body are surrounded by a multitude of fleshy tubes which compose a sort of cushion round their base.

A. aurantiaca, L.; Link., VI, VII, XXIII; Encyc. CX; Egypt. Echin., pl. iv, 1. The largest species of the European seas; the edges of its rays are furnished with pieces arranged like paving stones, on which strong and movable spines are articulated. The whole of the superior surface is covered with little spines, terminated by a truncated and bristly head(3).

Some species have more than five rays(4). Their cæca and ovaries are very short.

We should separate those species in which the rays are destitute of the longitudinal groove underneath for receiving the feet; generally, these rays are not hollow, and the stomach is not prolonged into them in the form of cæca, but its prominences remain in their intervals. Locomotion is principally effected by the curves and motions of the rays, and not by the feet, which are too few for that purpose.

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(1) *Asterias membranacea*, Link., I, 2;—*A. rosacea*, Lam.; Encyc., XCIX, 2, 3.

(2) *Asterias tesselata*, var. C and D, Lam.; Link., XXIII, 37, XXIV, 39; Encyc., 97 and 98, 1, 2;—*A. equestris*, L. and Lam.; Link., XXXIII, 53; Encyc., CI, CII; —*A. reticulata*, Lam.; Link., XLI, XLII; Encyc., C, 6, 7;—*A. militaris*, Müll., Zool. Dan., CXXXI;—*A. minuta*, Seb., III, v, 14, 15; Encyc., C, 1, 3:—*A. nodosa*, Link., II, III, VII; Encyc., CV, CVI.

(3) Add *A. rosea*, Müll., Zool. Dan., LXVII;—*A. violacea*, Ib., LXVI;—*A. echiniphora*, Lam.; Link., IV, 7; Encyc., CXIX, 2, 3;—*A. variolata*, Lam.; Link., VIII, 10; Encyc., Ibid., 4, 5;—*A. lævigata*, Link., XXVIII, 47; Encyc., CXX;—*A. seposita*, Link., IX, 16; Encyc. CXII, 1, 2.

(4) *Ast. paposa*, Link., XVII, 28, XXXIV, 54; Encyc, CVII, 3, 4, 6, 7;—*A. echinites*, Lam.; Solander and Ellis, Coral., LX—LXII; Encyc., CVII, A—C;—*A. helianthus*, Lam.; Encyc., CVIII and CIX.

Those, which have five non-ramous rays round a central disk, form the OPHIURÆ of M. Delamarck; but we should also distinguish

Those in which these rays are furnished on each side with movable spines; the little fleshy feet also issue from each side between the origin of those spines(1); and

Those in which there are none of these lateral spines, but where the rays are covered with imbricated scales, and resemble tails of serpents. The central disk, in each interval of its rays, and on the side where the mouth is placed, is marked by four holes which extend into the interior of the animal, serving perhaps for respiration, or, according to the others, for the issue of the ova. Their only feet are in five short grooves, which form a star round the mouth(2).

The GORGONOCEPHALÆ, Leach(3), called EURYALES by M. de Lamarck, are those in which the rays are dichotomously divided. In some this division commences at the base of the rays, presenting the appearance of a bundle of serpents—they are commonly called *Medusa's Head*(4). There are two preceding holes at the base of each ray.

In others, however, this division only commences at the end of the ray, and is not often repeated(5).

We should also separate the

ALECTO of Leach, called COMATULA by M. de Lamarck. They have five large articulated rays, each of which is divided into two or three, bearing two ranges of articulated threads; these five rays are attached to a petrous disk also furnished, on the side opposite to the mouth, with one, two or three ranges of articulated threads without branches, shorter and more slender than the large rays, and by which the animal is said to fix itself. The sac which contains the viscera is situated in the centre of the large rays, opening by a stellated mouth and a second and tubular orifice which may be the anus(1).

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(1) *Ast. nigra*, Müll., Zool. Dan., d, XCIII;—*A. tricolor*, Ib., XCVII; *A. fragilis*, Ib., XCVIII;—*A. filiformis*? Ib., LIX;—*A. aculeata*, Link., XXVI, 42; Müll., Zool. Dan., XCXIX;—*Ophiura echinata*, Lam.; Encyc., CXXIV, 2, 3;—*Oph. ciliaris*, Ib., 4, 5;—*Oph. lumbricalis*, Ib., 1.

(2) *Asterias ophiura*, L.; *Ophiura lacerta*, Lam., Encyc. CXXIII, 1, CXXII;—*Oph. texturata*, Id.; Link., II., 4; Encyc. CXXIII, 2, 3;—*Oph. cuspidifera*, Lam.? Encyc., CXXII, 5—8.

(3) Zool. Miscel., No. 16, p. 51.

(4) *Asterias caput Medusæ*, L., (*Euryale asperum*) Lam.; Link., XX, 32; Encyc. CXXVII;—*Euryale muricatum*, Ib., CXXVIII and CXXIX;—*Asterias euryale*, Gm. (*Euryale costosum*) Ib., CXXX; Link., XXIX and XXX.

(5) *Euryale palmiferum*, Lam., Encyc., CXXVI.

It is in the vicinity of the Comatulæ that we must place the

Encrinus, Guett.(2)

Which might be defined(3) as Comatulæ with a prolonged disk and a multiarticulated stem. The branches themselves are articulated and dichotomously ramose, bearing ranges of articulated threads, the stem being furnished with smaller ones at different heights; the mouth is in the centre of the rays, and the anus on one side.

But one very small species—*Pentacrinus europæus*, Thoms., Monog.—is found in the seas of Europe; it attaches itself to various Lithophyta.

The seas of hot climates produce larger and more complicated ones, such as the *Encr. asterias*, Blum.; *Isis aster*, L.

Fossil Encrinites however are very numerous, and so various, that they have been divided into several subgenera, according to the composition of the central body placed on the summit of the stem and from which the large rays proceed.

This body may be formed of pieces articulated with the stem, and bearing the rays by similar articulations. In this case, and if the stem be round and inflated above, we have the Apiocrinites, Miller;

If it be round, but not inflated, Encrinites;

If pentagonal, Pentacrinus.

Or this body may be formed of angular plates united at the edges, and forming several ranges. Of these

The Platycrinites have but two ranges; one of three plates, the other of five;

The Poteriocrinites have three ranges, each consisting of five plates;

The Cyathocrinites also three, and each of five, but the last is furnished with intercalated plates which may increase it to ten;

The Actinocrinites have several ranges, the first of three, the second of five, and the others more numerous. The two first are marked with radiating ridges;

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(1) *Asterias multiradiata*, Zool. Miscel., loc. cit., L.; Link., XX, 33, XXII, 34; Encyc., CXXV;—*Ast. pectinata*, L.; Link., XXXVII, 66; Encyc. CXXIV, 6, Egypt. Echin., I, 1, 2, &c.

(2) Acad. des Sc., 1755, p. 224.

(3) See Schweigger, Hist. Moll. et Zooph., p. 528.

The Rhodocrinites also have several ranges, the first of three, the second of five, and third of ten, all the three with ridges, the others are more numerous.

Finally, the central body may be formed of one piece, which appears, however, to consist of five pieces soldered together: here we have the Eugeniacrinites(1).

The fossil productions, known by the names of *Entrochites*, are portions of the stem and branches of animals belonging to this genus.

Echinus, Lin.

The Echini, or Sea-Urchins, as they are termed, have the body invested by a shell or calcareous crust, composed of angular pieces which join each other exactly, and perforated by innumerable holes, for the transmission of the membranous feet, disposed in several very regular ranges. The surface of this crust is armed with spines, articulated on little tubercles, that move at the will of the animal, whose motions, conjointly with the feet situated between them, they effect. Other membranous tubes, much finer and frequently divided at the extremity, probably serve to convey water into the interior of their shell, and then to remove it. The mouth is provided with five teeth, set in an extremely complex, calcareous framework, resembling a pentagonal lantern, furnished with various muscles, and suspended in a large aperture of the shell. These teeth, which resemble long ribands, become indented inferiorly as fast as they are worn away at the point(2). The intestine is very long, and attached, spirally, to the interior parietes of the shell by a mesentery. A double vascular system extends along this canal, and partly on the mesentery; there are also particular vessels for the feet. Five ovaries, situated round the anus, empty themselves by separate orifices; they form the edible portion of these animals.

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(1) No one has so carefully studied these productions, or described them so exactly as M. J. Miller, in his *Nat. Hist. of the Crinoïdea.* Bristol, 1821, in 4to. It is to this work that we are indebted for our article. Excellent figures of the same are also given by M. George Cumberland, in his *Reliquiæ conservatæ.* Bristol, 1826.

(2) See my Leçons d'Anat. Comp., IV, and the work of Tiedemann already quoted.

The Echini chiefly feed on small shell-fish, which they seize with their feet. Their motions are very slow. Shells of Echini are very abundant in the ancient strata, principally those of chalk, where they are usually filled with silex.

The Echini should be divided into regular and irregular.

In the first,

Echinus, Lam.—Cidaris, Klein.

Or Echinus properly so called, the shell is generally spheroidal, the mouth in the middle of the inferior surface, and the anus diametrically opposite. The little foramina are arranged in ten bands, approximated by pairs, that extend regularly from the mouth to the anus, like the meridian lines of a globe.

Certain species are furnished with large and stout spines of various forms, placed on large tubercles on their shell, the bases of which are surrounded by other but smaller spines(1).

It is among these species, as ascertained by M. Deluc, that we must place those whose olive-like spines are often found petrified in chalk, and other ancient formations, called *pierres judaiques*(2).

The most common species, and particularly those of the coast of France, are merely furnished with slender spines, articulated on small tubercles that are much the most numerous. Such is the

> *E. esculentus*, L.; Klein., Lesk., I, A, B; Encyc. 132. The common Echinus is of the form and size of an apple, completely covered with short, radiating and usually violet spines. Its ovaries, which are reddish, and of an agreeable flavour, are edible in the spring.

The neighbouring species are distinguished with difficulty, by the greater or less approximation of the bands of holes, the equality or inequality of the tubercles, &c.(3)

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(1) *Echinus mammillatus*, L.; Seb., III, xiii, 1—4; Encyc., pl. 138, 139, and the naked shell, Ib., 138, 3, 4;—The different species approximated under the name of *Ech. cidaris*, Scill., Corp. Mar. Tab., xxii; Seb., III, xiii, 8, &c.;—*Ech. verticillatus*, Lam.; Encyc., 136, 2, 3;—*Ech. tribuloïdes*, Id., Encyc., Ib., 4, 5;—*Ech. pistillaris*, Id., Encyc., 137;—*Ech. stellatus*, L.; Seb., III, xiii, 7;—*Ech. araneïformis*, Id., Ib., 6;—*Ech. saxatilis*, Id., Ib., 10;—*Ech. calamarius*, Pall.; Spicil. Zool., X, ii, 1—7.

(2) See the Letters from Switzerland of Andreæ, pl. XV, and the Memoir of M. Deluc, Mém. des Sav. Etrang., IV, 467.

N.B. The naked shells are distinguished with difficulty: such are the *Ech. excavatus*, L.; Scill., Corp. Mar., xxii, 2, D;—*Ech. ovarius*, Bourguet., Petrif., LII, 344, 347, 348.

(3) *Ech. miliaris*, Kl., II, A, B; Encyc., 133, 1, 2;—*Ech. hemisphericus*, Kl., II,

The regularity of certain round and depressed Echini is diminished by a wide furrow on one side(1).

Some of these Echini, where the mouth is opposite to the anus, instead of having a spheroidal form on a circular plane, are transversely oval, that is to say, one of their horizontal diameters is greater than the other(2).

They also differ among themselves by the equality or inequality of the spines, and the relative proportions of the tubercles.

> We should distinguish one species—*Echinus atratus*, L.; Encyc., 140, 1—4—in which the widened spines, truncated and angular at the extremity, touch each other like stones in a pavement. Those of the margin are long and flattened.

We call all those Echini irregular, in which the anus is not opposite to the mouth. It appears that they are merely furnished with short and slender spines, almost like hairs. Of these, some still have the mouth in the middle of the base. They may be subdivided according to the extent of the bands of holes that transmit the feet; sometimes, as in the preceding ones, they extend from the mouth to a point directly opposite, where, after having clasped the whole shell, they reunite.

Echinoneus, Phels. and Leske.

Where we observe the round or oval form of certain regular Echini, the mouth in the middle of the base, and the anus between the mouth and the margin, or near the latter, but underneath(3).

E; Encyc., Ib., 4;—*Ech. angulosus*, Kl., II, A, B, F; Encyc., Ib., 5, 6, 7;—*Ech. excavatus*, Kl., XLIV, 3, 4; Encyc., Ib., 8, 9, very different from Scill., XXII, 2, D, which belongs to the preceding section;—*Ech. saxatilis*, Kl., V, A, B; Encyc., 134, 5, 6; *Ech. saxatilis*, B, Seb., III, xiii, 10, is very different, and belongs to the preceding section;—*Ech. fenestratus*, Kl., IV, A, B;—*Ech. subangularis*, Id., III, C. D; Encyc., 134, 1, 2;—*Ech. diadema*, Kl., XXXVII, 1; Encyc., 133, 10;—*Ech. radiatus*, Seb., III, xiv, 1, 2; Encyc. 140, 5, 6;—*Ech. circinnatus*, Kl., XLV, 10;—*Ech. coronalis*, Kl., VIII, A, B; Encyc., 140, 7, 8;—*Ech. asterisans*, Kl., VIII, F; Encyc., 140, 9;—*Ech. sardicus*, Kl., IX, A, B; Encyc., 141, 1, 2;—*Ech. flammeus*, Kl., K, A; Encyc., 141, 3;—*Ech. variegatus*, Kl., X., B, C; Encyc., 141, 4, 5;—*Ech. granulatus*, Kl., XI, F; Encyc., 142, 1, 2;—*Ech. toreumaticus*, Kl., X, D, E, Encyc. 142, 4, 5, &c.; I do not however pretend to answer for all the synonymes, or to assert that there are no repetitions.

(1) *Ech. sinuatus*, Kl., VIII, A; Encyc., 142, 7, 8.

(2) *Ech. lucunter*, Kl., II, E, F; Seb., X, 16, and the species figured in Seb., Ib., 17 and 8.

(3) Oval species: *Echinus cyclostomus*, Müll., Zool. Dan., XCI, 5, 6; Encyc.,

Nucleolites, Lam.

The same characters, with the anus near the margin, but above.

The species known are all fossil(1). Others again,

Galerites, Lam.—Conulus, Kl.

Have a flat base, from which their body rises in a cone or semi-ellipsoid. The mouth is in the middle of the base, and the anus near its margin.

They are very common in the stony strata, but no living ones are known.

The most common, species is the *Ech. vulgaris*, L.; Encyc., 153, 6, 7; Klein, Fr. edit., VII, D. G.(2)

The number of bands in some is not quinary(3).

Scutella, Lam.

Where the anus is betweeen the mouth and the margin, the shell extremely depressed, flat underneath, and approaching to an orbicular form.

In some the shell is entire without any other openings than the series of pores visible in all the Echini(4).

The shell is also without large orifices in others, but is bi-emarginated(5).

In some again it is entire and traversed by large holes which do not penetrate into its cavity(6).

153, 19, 20;—*Ech. semilunaris*, Seb., III, x, 7; Encyc., 153, 21, 22;—*Ech. scutiformis*, Scill., Corp. Mar., XI, No. ii, fig, 1, 2.

Round species: E, Encyc., 153, 1, 2;—*Ech. depressus*, Walck., II, E, ii, 6, 7; Encyc., 152, 7, 8;—*Ech. subuculus*, Kl., XIV, L—O; Encyc., 153, 14, 17.

(1) *Spatangus, depressus*, Leske, ap. Klein, LI, fig., 1, 2; Encyc., 157, 5, 6.

(2) Add *Ech. albo-galerus*, L.; Bourg., Petrif., LIII, 361; Encyc., 152, 5, 6.

(3) *Ech. quadrifasciatus*, Walch., Monum., Dil. Supplem., IX, d, 3, and IX, g, 7—9; Encyc., 153, f. 10, 11;—*Ech. sexfasciatus*, Walch., Supplem., IX, g, 4, 6; Encyc., 153, f. 12 and 13.

(4) *Ech.*, Encyc. 146, 4, 5.

(5) *Echinus auritus*, Seb., III, xv, 1, 2; Encyc., 151, 5, 6;—*Ech. inauritus*, Seb., III, xv, 3, 4; Encyc., 152, 1, 2.

(6) *Echinus hexaporus*, Seb., III, xv, 7, 8; Encyc., 149, 1, 2;—*Ech. pentaporus*, Kl., Fr. Ed., XI, C; Encyc., 149, 3, 4;—*Ech. biforis*, Encyc., 149, 7, 8;—*Ech. emarginatus*, Encyc., 150, 1, 2.

In others it is both traversed by these large-holes, and emarginated(1).

Finally, in the Rotula, Kl., part of the posterior margin is festooned like a dentated wheel; the Rotulæ are also divided into those which are traversed by large holes(2), and those in which they are wanting(3).

Cassidulus, Lam.

The Cassiduli are oval, with the anus situated above the margin as in the Nucleolites, but are distinguished by their incomplete bands of pores, that is they do not extend from one pole to the other in the figure of a star(4).

In other irregular Echini the mouth is not in the centre of their base, but on one side, opening transversely and placed obliquely; the anus is on the opposite side. They are also subdivided according to the extent of the ranges of holes.

Thus the Ananchites, Lam.—Galleæ, Kl.,—are nearly similar in form to the Galerites, and have their complete bands; they chiefly differ in the position of their mouth. They are all fossil.

Such is the *Echinus ovatus*, L.; Cuv., et Brongn., Envir. de Par., 2d edit., f. V, 7, A, B, C, D. Very abundant in the chalk in the environs of Paris(5).

The bands in some are quaternary(6).

We might form a separate subgenus of certain species in which the four lateral bands are arranged by pairs, and do not meet at the same point(7).

Sometimes these irregular Echini with a central mouth have bands of pores which do not extend as far as the mouth, but form a sort of rosette on their back, as in

Clypeaster, Lam.—Echinanthus, Kl.

Where the anus is near the margin, and the body is depressed, with an oval base concave underneath. The contour is sometimes slightly angular(1).

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(1) *Ech. tetraporus*, Seb., XV, 5, 6; Encyc. 148.

(2) *Ech. decadactylus*, Encyc., 150, 5—6;—*Ech. octodactylus*, Ib., 3, 4.

(3) *Ech. orbiculus*, Encyc., 151, 1—4.

(4) *Cassidulus caribæorum*, Lam., Encyc., 143, 8, 10;—*Ech. lapis cancri*, Kl., XLIX, 10, 11; Encyc., 143, 6, 7;—*Ech. patellaris*, Kl., LIII, 5, 6, 7.

(5) *Ech. scutatus*, Walch., Mon. Dil., II, E., i, 3, 4;—*Ech. pustulosus*, Kl., XVI, A, B; Encyc. 154, 16, 17;—*Ech. papillosus*, Kl., XVI, C, D; Encyc., 155, 2, 3.

(6) *Ech. quadriradiatus*, Kl., LIV, 1; Encyc., 155, 1.

(7) *Ech. bicordatus*, Kl.;—*Ech. ovalis*, Kl., XLI, 5; Encyc., 159, 13, 14;—*Ech. carinatus*, Kl., LI, 3, 4; Encyc. 158, 1, 2.

Sometimes the middle of the back is elevated(2).

There are some also in which the contour is not angular(3).

And others in which it is almost orbicular—Laganum, Kl.(4) In

Fibularia, Lam.—Echinocyamus, Leske,

We observe the rosette of Clypeaster, an almost globular body, with the mouth and anus appropriated beneath. The Fibulariæ are generally very small(5). In

Spatangus, Lam. Kl.

On the contrary, we find the lateral mouth of the Ananchites, and incomplete bands of pores forming a rosette on the back. There are usually but four of them; the one that extends towards the mouth is obliterated.

Some—Brissoides, Kl.—have an oval shell without furrows(6).

Others have a furrow, more or less strongly marked, in the direction of the obliterated band(7). When they are oval they constitute the Brissus, Kl.; but sometimes this furrow is deep and the shell is widened, assuming the figure of a heart(8).

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(1) *Ech. rosaceus*, and its varieties, Encyc., 143, 1—6; 144, 7, 8; 147, 3, 4, taken from Klein, &c.

(2) *Ech. altus*, Scill., Corp. Mar., IX, 1, 2.

(3) *Ech. oviformis*, Seb., III, x, 23; Encyc. 144, 1, 2;—*Ech. reticulatus*, Seb., XV, 23, 24, 35—38; Encyc., 141, 5, 6;—*Ech. pyriformis*, Kl., LI, 56; Encyc. 159, 11, 12?

(4) *Echinus orbiculatus*, Bourg., Petrif., LIII, 352;—*Ech. laganum*, Seb., XV, 25, 26;—*Ech. subrotundus*? Scill., Corp. Mar., VIII, 1, 3;—*Ech. orbicularis*, Gualt., Test., CX, B;—*Ech. corollatus*, Walch., Mon. Diluv., II, E, ii, 8.

(5) *Ech. nucleus*, Kl., XLVIII, 2, a, e; Encyc., 153, 24—28;—*Ech. lathyrus*, Kl., XLVIII, 1, a, e; Encyc., 154, 6, 10;—*Ech. craniolaris*, Pall., Spicil. Zool., IX, 1, 24; Encyc., 154, 1—5, &c.

(6) *Ech. teres*, Seb., III, xiv, 3, 4, 5, 6, X, 22, ab. 19; Encyc., 158, 7—11, 159, 1, 2, 3, &c.;—*Ech. brissoïdes*, Kl., XXVII, B; Encyc., 259, 4;—*Ech. amygdala*, Kl., XXIV, h, i; Encyc., 159, 8, 10.

(7) *Ech. spatangus*, Seb., III, xiv, 3, 4, 5, 6, X, 22, ab. 19; Encyc., 158, 7—11, 159, 1, 2, 3, &c.;—*Ech. radiatus*, Kl., XXV; Encyc., 156, 9, 10;—*Spat. suborbicularis*, Cuv., and Brongn., Envir. de Par., 2d edition, v, 5;—*Spat. ornatus*, Ib., 6.

(8) *Ech. purpureus*, Müll., Zool. Dan., VI;—*Ech. flavescens*, Id., XCI, to which

Species of these two last forms are found in European seas. Their mouth is surrounded with ramous tentacula like that of the Holothuriæ.

HOLOTHURIA, Lin.

The Holothuriæ have an oblong coriaceous body open at each end. At the anterior extremity is the mouth, surrounded with complicated tentacula susceptible of being entirely retracted. At the opposite end is the aperture of a cloaca in which the rectum and organ of respiration terminate, the latter in the form of an extremely ramified hollow tree, which is filled with water, or emptied, at the will of the animal. The mouth is edentate, or merely furnished with a circle of bony pieces; it receives saliva from certain sac-like appendages. The intestine is very long, variously flexed, and attached to the sides of the body by a mesentery; there is a sort of partial circulation in an extremely complex and double system of vessels, entirely restricted to the intestinal canal, and in a portion of the meshes with which one of the two arborescent organs abovementioned is intertwined. There also appears to be a very attenuated nervous cord round the esophagus. The ovary is composed of a multitude of blind and partly ramous vessels, all terminating in the mouth by a small common oviduct; at the period of gestation they become enormously distended, and are filled with a red and grumous substance that appears to be the ova. Excessively extensible strings, inserted near the anus, appear to constitute the male organs of generation, and consequently, these animals are hermaphrodites. When disturbed, it frequently happens that they contract so violently as to rupture and protrude their intestines(1).

The Holothuriæ may be divided according to the arrangement of their feet.

In some, they are all situated in the middle of the under part of the body, that forms a softer disk on which the animal crawls, turning up the two extremities, in which are the head and anus, that are narrower than the middle. The anus in particular terminates almost in a point. Their tentacula, when developed, are very large.

H. phantapus, L.; Müll., Zool. Dan., CXXII, CXXIII, Stockh. Mem., 1767. The envelope almost squamous; the feet

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we should probably refer several of the shells united under *Ech. lacunosus*, such as Seb., III, x, 21; Encyc., 156, 7, 8.

(1) For the anatomy of the Holothuriæ, see the excellent work of M. Tiedemann already quoted.

of its ventral disk arranged in three series. From the seas of Europe.

In others, the inferior surface is altogether flat, soft, and furnished with a multitude of feet; the superior is convex, even supported by osseous scales, and perforated anteriorly by a stellate orifice, or the mouth, from which proceed the tentacula, and posteriorly by a round hole, which is the anus.

H. squamata, Müll., Zool. Dan., X, 1, 2, 3. A small species inhabiting European seas; those of hot climates produce larger ones(1).

Here, the body is cartilaginous, horizontally flattened, and trenchant at the edges; the mouth and feet are situated on the inferior surface, and the anus is placed at the posterior extremity.

H. regalis, Cuv.; *Pudendum regale*, Fab. Colum., Aquat., XXVI, 1. More than a foot in length, and from three to four inches wide; crenulated all round. From the Mediterranean.

There, the body is cylindrical and susceptible of being inflated in every direction by the absorption of water; the whole of the inferior surface is furnished with feet, and the remainder variously roughened.

H. tremula, Gm.; Bohatsch., Anim. Mar., VI, VII. Blackish, and when completely extended more than a foot long; its back is bristled with soft and conical points, and its mouth provided with twenty ramous tentacula. This species is very common in European seas, the Mediterranean particularly(2).

There are some whose feet are arranged in five series that extend from the mouth to the anus like the ribs of a melon, whence their vulgar name of *Sea Cucumbers*. Such is

H. frondosa, L.; Gunner., Stockh. Mem., 1767, pl. iv, fig. 1, 2; *Pentacta*, Abildg., Zool. Dan., CVIII, 1, 2, and CXXIV. More than a foot in length, with a brown body. The European seas(3).

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(1) Those which Péron calls the CUVIERIES.

(2) Add *Holothuria elegans*, Müll., Zool. Dan., I and II, which is the *Hol. tremula* of Gunner, Stockh. Mem., 1767, pl. iv, f. 3, of the 12th edition. These authors, however, do not describe it as being furnished with feet underneath;—*Fleurilarde*, Diquemare, Journ. de Phys., 1778, Octob., pl. 1, f. 1.

(3) The other figures quoted under *Hol. pentactes*, viz. Zool., Dan., XXXI, 8; the *Echinus coriaceus*, Planc., Conch., Min. Not. App. VI, D, E; *Cucumis marinus*, Rondel., Insect., et Zooph., 131, are probably different species. The *Fleurilarde*, Diquem., even belongs to another section of the genus.

Add *Hol. inhærens*, Zool., Dan., XXXI, 1—7;—*Hol. pellucida*, Ib., CVXXV, 1;—*Hol. lævis*, Fab., Groenl., No. 345;—*Hol. minuta*, Ib., No. 346. Perhaps the *Hol. doliolum*, Pall., Misc. Zool., pl. xi, f. 10.

Finally, there are some in which the body is equally furnished with feet all round(1).

ORDER II.

APODA.

Our second order of the Echinodermata, or the Apoda, comprises but a small number of animals closely related to the Holothuriæ, but which want the vesicular feet of the preceding order. Their body is invested with a coriaceous unarmed skin. Several points of their internal structure are not well understood. In

MOLPADIA, Cuv.

As in Holothuria, we find a coriaceous body forming a thick cylinder open at both ends, and a tolerably similar internal organization; but independently of the want of feet, the mouth is destitute of tentacula, and is provided with an apparatus of bony parts, but less complicated than that of the Echini.

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(1) *Hol. papillosa*, Zool. Dan., CVIII, 5;—*Hol. fusus*, Ib., X, 5, 6;—*Hol. impatiens*, Forsk., Ic., XXXIX, B? Eg. Echin., IX, 6.

N.B. It is impossible to class the *Hol. vittata*, Forsk., XXXVIII, E, and the *Hol. reciprocans*, Ib., A, for want of sufficient descriptions. The last is improperly quoted under *inhærens* by Gmelin;—the *Hol. maculata*, Chamiss., Act. Nat. Cur., X, 1, xxv, which closely approaches it, should be particularly examined on account of its excessive length;—the *Hol. thalia*, *caudata*, *denulata*, and *zonaria* are Biphoræ;—the *Hol. physalus*, is the genus PHYSALUS;—the *Hol. spirans*, the genus VELELLA;—the *Hol. nuda*, the genus PORPITA;—the *Hol. priapus*, the genus PRIAPULA. I suspect the *Hol. forcipata*, Fab., Groën., No. 349, to be a mutilated Thalassema.

M. holothurioïdes, Cuv. The only species that I know in the Atlantic Ocean. The anal extremity terminates in a point.

MINYAS, Cuv.

Where the body is also destitute of feet and open at both extremities; but its form is that of a spheroid depressed at the poles, and furrowed like a melon. I can find no armature about the mouth.

M. cyanea, Cuv., Régn., Anim., IV, pl. xv, f. 8(1). A beautiful species of a deep-blue colour that inhabits the Atlantic ocean(1).

PRIAPULUS, Lam.

Where the body is cylindrical and transversely marked with deep annular rugæ, terminated anteriorly by an elliptical mass slightly wrinkled longitudinally, perforated by the mouth, and posteriorly by the anus, from which issues a thick bundle of filaments which may be organs of generation. The interior of the mouth is provided with a great number of extremely sharp and horny teeth arranged in quincunx, and directed backwards; the intestine proceeds in a straight line from the mouth to the anus. The muscular system resembles that of the Holothuriæ.

P. vulgaris; Holothuria priapus, Müll., Zool. Dan., XCVI, 1. It is from two to three inches in length, inhabits northern seas, and is the only species known.

LITHODERMIS, Cuv.

Where the body is oval and compressed posteriorly; its surface has the appearance of being covered with a layer of stony granules, which form an extremely indurated crust. The mouth is surrounded with tentacula, and the intestines seem to be analogous to those of the Holothuriæ. They have no anus that I can perceive.

L. cuneus, Cuv. Blackish, and two inches in length. From the seas of India, and the only species known. In

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(1) Taken to France by M. Péron.

SIPUNCULUS, Gm.

The body is cylindrical and elongated, the skin thick and wrinkled in both directions. The mouth is provided with a sort of proboscis susceptible of retraction and protrusion by the action of large internal muscles, and the anus is more or less approximated to the base of that organ. The intestine proceeds from the mouth to near the opposite extremity, and then returns, twining spirally round itself. The only matters found in it are sand and fragments of shells. Numerous vessels appear to unite it with the external envelope, besides which, a thread extends along one of its sides which may possibly be nervous. Two long bursæ, situated anteriorly, open exteriorly a little below the anus, and near this last orifice, internally, we sometimes find a bundle of ramous vessels which may be organs of respiration.

These animals are found in the sands of the sea, like the Arenicolæ and Thalassemæ, and like them are used as bait by the fishermen.

S. edulis, Cuv.; *Lumbricus edulis*, Gm.; Pall., Spicil. Zool., X, 1, 7. This species is eaten by the Chinese inhabitants of Java, who procure it from the sands by means of slender bamboos prepared for the purpose(1).

Other and rather small species—*Sp. lævis*, *Sip. verrucosus*, Cuv.—perforate submarine rocks and live in their cavities.

BONELLIA, Rolando.

Here the body is oval and furnished with a proboscis formed of a double lamina susceptible of great elongation and forked at the extremity. The anus is at the opposite extremity of the body. The intestine is very long and frequently flexed, and near the anus we observe two ramified organs which may serve for respiration. The ova are contained in an oblong sac opening near the base of the proboscis. The Bonelliæ live at a considerable depth in sand, extending their proboscis to the water and even to the air above its surface when the tide is low.

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(1) I cannot perceive where this species differs from the *Vermis macrorhynchoteros*, Rondel., of the salt-ponds of Languedoc, which is the *Sipunculus nudus* of Linnæus.

The *Sipunculus saccatus* appears to be a specimen divested of its epidermis.

In one species the epidermis is pilose, in another the skin is entirely coriaceous; neither of them is mentioned by authors.

The seas of India produce one that is nearly two feet in length.

B. viridis, Rol., Acad. of Tur., XXVI, pl. xiv. It inhabits the Mediterranean(1).

THALASSEMA, Cuv.

Where the body is oval or oblong and the proboscis in the form of a doubled lamina or bowl of a spoon, but not forked. The intestinal canal resembles that of the Bonelliæ. They have but one abdominal thread.

The Thalassemæ are divided into

THALASSEMA, proper,

Where these two hooks are placed far forwards, and the posterior extremity is destitute of setæ(2); and

ECHIURUS,

Where the posterior extremity is furnished with transverse ranges of setæ.

E. vulgaris; Lumbricus echiurus, Gm.; Pall., Miscel. Zool., XI, 1—6. Found along the coast of France in sandy bottoms. It is used as bait by fishermen.

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(1) In Rolando's description, the mouth is converted into the anus, and vice versa.

(2) *Thalassema Neptuni*, Gert., or *Lumbricus thalassema*, Pall. Spicil. Zool., fasc. X, tab. I, fig. 6;—*Thalassema mutatorium*, Montag., Lin. Trans., XI, v, 26, may not differ from the preceding one.

STERNASPIS, Otto.

Where, in addition to the setæ of the Echiuri, we observe anteriorly a slightly corneous disk surrounded with cilia(1).

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(1) *Thalassema scutatum*, Ranzan., Dec. I, pl. 1, f. 10—12, or *Sternaspis thalassemoïdes*, Otto, Monog.

A late examination of the Thalassemæ has proved to me that this is their proper place.

CLASS II.

ENTOZOA, Rud.

The Entozoa or Intestinal Worms are remarkable, because the greater number inhabit the interior of other animals, and there only can propagate. There is scarcely a single animal that is not the domicil of several kinds, and those which are observed in one species are rarely found in many others. They not only inhabit the alimentary canal and the ducts that empty into it, such as the hepatic vessels, but even the cellular tissue, and the parenchyma of the most completely invested viscera, such as the liver and brain.

The difficulty of conceiving how they get there, added to the fact of their never having been seen out of living bodies, has induced some naturalists to believe that they are spontaneously engendered. We now know that most of them not only evidently produce ova or living young ones, but that in many, the sexes are separate, and coition ensues as among other animals. We are then compelled to believe, that they propagate their race by germs sufficiently minute to be transmitted through the narrowest passages, and that frequently those germs are contained in animals at birth.

In the Intestinal Worms we find neither tracheæ, nor any other organ of respiration, and they must receive the influence of oxygen through the medium of the animal they inhabit. They present no trace of a true circulation, and we merely perceive vestiges of nerves so extremely obscure, that many naturalists have doubted their existence(1).

When those characters are found united in an animal with a form similar to that of this class, we place it here, although it may not inhabit the interior of another species.

The injury caused by worms to animals, in which they become excessively multiplied, is well known. The most efficacious agent for destroying those of the alimentary canal seems to be animal oil mixed with spirits of turpentine(2).

We will divide the Entozoa into two orders, which are perhaps sufficiently different in organization to form two classes, if we had the observations requisite to determine their limits. These orders are the

ENTOZOA NEMATOIDEA, Rud.

Which have an intestinal canal floating in a distinct abdominal cavity, a mouth and anus; and the

ENTOZOA PARENCHYMATA(3),

Where the parenchyma of the body contains obscurely terminated viscera, most commonly resembling vascular ramifications, and sometimes not visible.

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(1) For the anatomy of these Worms, besides the Entozoa of Rudolphi, see the Mem. of M. Otto, Soc. Nat. Berl., 1816, and the work of M. J. Cloquet.

(2) See Chabert, Traité des Maladies Vermineuses, and Rudolphi, I, p. 493.

(3) They comprise the four last orders of Rudolphi.

ORDER I.

NEMATOIDEA, Rud.(1)

This order comprises those whose external skin, more or less furnished with muscular fibres, and usually striated transversely, contains an abdominal cavity in which is a distinct intestinal canal, extending from the mouth to the anus, and where we generally observe distinct organs in each of the sexes. The intestine is connected with the neighbouring parts, and the general envelope of the body by numerous threads, considered by some writers as vessels for the conveyance of the nutritious fluid, and by others as tracheæ, but without any proof of the fact. It is impossible to detect any true circulation in these animals, but in several there appear to be one or two nervous cords arising from a ring which surrounds the mouth, and extending the whole length of the body along the internal surface of the envelope.

The intestine is generally straight, and tolerably wide; the esophagus is frequently smaller, and in some species we remark a larger and more vigorous stomach. The internal organs of generation consist of extremely long vessels, containing the semen or the ova, which open at different points, according to the genus.

FILARIA, Lin.

Where the body is elongated, slender, filiform, and perforated at the anterior extremity by a round oral aperture. The Filariæ in their external appearance are very similar to the Gordii. They are chiefly found in those cavities of animals which do not open externally, such as the cellular membrane, and even in the thickness of the membranes and the parenchyma of the viscera; there we sometimes find them in bundles and countless numbers, enveloped in species of capsules. They are found in Insects and their larvæ, and even in the visceral cavity of several Mollusca. The most celebrated species of this genus

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(1) This order, with the exception of the two last genera, constitutes the ENTOMOZAIRES APODES OXYCEPHALES of M. de Blainville.

F. medinensis, Gm.; Encyc. XXXIX, 3 (The Guinea Worm), is very common in hot climates, insinuates itself under the skin of man, generally that of the leg, where, if credence be given to the reports of certain authors, it acquires a length of ten feet and more, may remain there several years without producing violent pain, or cause intense agony and excite convulsions, according to the nature of the part it attacks. When it shows itself externally, it is seized and extracted very slowly for fear of breaking it. It is about as thick as the barrel of a Pigeon's quill. Its pointed and hooked tail constitutes its distinguishing character(1).

TRICHOCEPHALUS.

Where the body is round, thickest posteriorly, and as slender as a thread anteriorly. This slender part is terminated by a round mouth. The most common species is the

T. dispar, Rud.; Gœtz., VI, 1, 5; Encyc., XXXIII, 1, 4. From one to two inches in length, of which the thickest portion forms but the third. This part, in the male, is spirally convoluted, and a little penis projects near the tail. It is straighter in the female, and simply perforated at the extremity.

It is one of the most common Worms in the great intestines of Man, where, in certain diseases, it becomes prodigiously multiplied(2).

Naturalists have distinguished from the preceding the

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(1) For the other Filariæ, see Rud., Hist., II, 57, Syn., p. 1.

N.B. Rudolphi, in his Synopsis, has suppressed the genus HAMULARIA, which was characterized by two little oval filaments. On examination, they were found to be the male organs of generation, placed at the posterior extremity.

(2) For the Tricocephali of animals, see Rud., Ent., II, 86, and Syn., p. 16.

TRICHOSTOMA, Rud.—CAPILLARIA, Zeder,

Where the anterior portion of the body is but gradually attenuated(1).

OXYURIS, Rud.

Where the posterior part of the body is attenuated in the manner of a thread.

O. curvula, Rud.; Gœtz., VI, 8; Encyc., XXXIII, 5. From one to three inches in length. It inhabits the cæcum of the Horse(2).

CUCULLANUS.

Where the body is round, and most slender posteriorly. The head is obtuse and invested with a sort of hood that is frequently striated; the mouth is round.

They have hitherto been found in Fish only. The most common species is that which inhabits the Perch—*C. lacustris*, Gm.; Gœtz., IX, A, 3; Encyc. XXXI, 6—and also infests the Pike, &c. It is viviparous, about an inch long, as thick as a thread, and of a red colour, owing to the blood with which its intestine is usually filled(3).

OPHIOSTOMA.

The same kind of body as the preceding, but distinguished by a transversely cleft mouth, and consequently furnished with two lips.

O. cystidicola, Rud.; *Cystidicola*, Fischer, Monog. It is found in the natatory bladder of certain Fishes(4).

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(1) See Rud., Syn., 13.

(2) Add *Ox. alata* and *Ox. ambigua*, Rud., Syn., 19.

(3) For the other species, see Rud., Hist., II, 102, and Syn., 19.

(4) Rud., Hist., II, 117, and Synop., 60.

ASCARIS, Lin.(1)

The Ascarides have a round body, attenuated at each extremity, and a mouth furnished with three fleshy papillæ, between which an extremely short tube occasionally projects. This genus is very numerous in species which are found in all kinds of animals. Those which have been dissected presented a straight intestinal canal, and the females, by far the greater number, exhibited an ovary with two branches, several times the length of the body, opening externally by a single oviduct, near the anterior fourth of the total length of the animal. The males have but a single seminal vessel, also much longer than the body, which communicates with a (sometimes double) penis that protrudes through the anus. The latter opens under the extremity of the tail.

Two white threads, one of which extends along the back, and the other along the belly, are considered by Messrs Otto and Cloquet as the nervous system of these animals; two other and thicker threads, one on the right and the other on the left, are considered by some as muscular, and by others as vascular, or even as tracheæ.

In some, the head is destitute of lateral membranes. The most common species.

A. lumbricoïdes, L., is found without any essential difference in Man, the Horse, Ass, Zebra, Hemiona, Ox and Hog. It has been seen more than fifteen inches in length. Its natural colour is white, and it sometimes multiplies excessively, occasioning disease and death, particularly in children, or when it ascends into the stomach.

Other species are furnished with a little membrane on each side of the head. Such is

A. vermicularis, L.; Gœtz., V, 1—6; Encyc. Méthod., Vers, XXX, pl. x, 1. Very common in children, and in adults afflicted with certain diseases, in which it causes an insupportable itching at the anus. It is not more than five lines in length, and is thickest anteriorly(2).

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(1) *ἀσκαρις*, the name of the small species that is found in Man, is derived from *ασκαριζω*, to leap, to move.

(2) For the remaining species of Ascarides that infest animals, see Rud., Hist., II, 128, et seq. and Synop., p. 37, et seq.

STRONGYLUS, Mull.(1)

Where the body is round, and the anus of the male is enveloped by a sort of bursa, variously shaped, from which issues a little thread that appears to be an organ of generation. These two last characters are wanting in the female, which has sometimes caused her to be taken for an Ascaris.

In some of these Strongyli the mouth is ciliate or dentated. Such is

S. equinus, Gm.; *Str. armatus*, Rud.; Müll., Zool. Dan., II, xlii; Encyc. Méthod., XXXVI, 7—15. Two inches in length; head hard and spherical, and the mouth surrounded by small, soft spines; bursa of the male trifoliate. Of all the Worms that infest the Horse, this is the most common; it even penetrates into the arteries where it occasions aneurisms. It is also found in the Ass and Mule.

The mouth of others is merely surrounded by tubercles or papillæ. Such particularly is the

S. gigas, Rud.; *Ascaris visceralis* and *Asc. renalis*, Gm.; Redi., An. Viv. in An. Viv., pl. VIII and IX; Le DIOCTOPHYME, Collet-Meygret, Journ. de Phys., LV, p. 458. The most voluminous of all known intestinal Worms; it is upwards of two or three feet in length, and as thick as the little finger. The most singular circumstance attending this Strongylus is that it is most usually developed in one of the kidneys of various animals, such as the Wolf, Dog, Mink, and even Man, where it lies doubled up, distending that organ, destroying its parenchyma, and probably occasioning the most excruciating agony to the animal in which it resides. It has been occasionally known to pass off with the urine, while yet small. It sometimes inhabits other viscera. Its usual colour is a beautiful red; the mouth is surrounded with six papillæ; the intestine is straight and transversely rugose, the ovary simple, three or four times the length of the body, communicating exteriorly by a hole a little distance posterior to the mouth, and, as it appears, by the other extremity with the anus. An extremely attenuated white thread that extends along the abdomen is considered by M. Otto as the nervous system(2).

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(1) Στρογγυλος, round.

(2) Otto, Magas., of the Soc. Nat. Berl., 1816, p. 225, pl. v.

Naturalists have lately separated from the Ascarides and Strongyli the

SPIROPOPTERA,

Where the body terminates spirally, and is surrounded by two wings from between which issues the penis(1).

One species is said to be occasionally found in the human bladder. Another, the

Sp. strumosa, Nitsch, inhabits the Mole. It penetrates into a ring which it forms in the villous coat of the stomach, and attaches itself there by a small tubercle(2).

PHYSALOPTERA.

Where the posterior extremity is provided with a bladder between two little wings, and a tubercle from which the penis originates(3).

SCLEROSTOMA, Blainv.

Where the mouth is furnished with six small dentated scales.

They are found in the Horse and in the Hog.

LIORHYNCHUS, Rud.

Where the mouth is in the form of a little proboscis(4).

PENTASTOMA, Rud.

Where the body is depressed and trenchant on the sides, and the transversal rugæ are marked by numerous crenulations. The skin is thin and slight; the head broad and flattened; and the mouth beneath; on each side of the latter are two small longitudinal clefts from which issue little hooks. The intestine is straight and the genital vessels are long and tortuous. Both the former and latter open externally at the posterior extremity. Near the mouth are two cæca as in Echinorhynchus. A white thread encircles the mouth and gives off two descending trunks in which I think I have recognized the appearance of a nervous system.

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(1) Rud., Syn., p. 22.

(2) Nitsch, Monog., Gm., Hal. Sax., 1829.

(3) Rud., Syn., 29.

(4) Rud., Hist., II, 247, et seq.

This genus connects the Nematoidea with the Parenchymata.

One species is known—*Tænia lanceolé*, Chabert; *Polystoma tænioides*, Rud., Hist., II, xii, 8, 12; *Pentastoma tænioides*, Id. Syn., 123—which attains a length of more than six inches. It is found in the frontal sinus of the Horse and Dog(1).

This is probably the place for the

PRIONODERMA, Rud.

Where the body and intestines are very similar, but where the mouth is at the anterior extremity, simple, and armed with two little hooks.

But one species is known, the *Cucullanus ascaroides*, Gœtz., pl. viii, f. ii, iii; Rud., Hist., II, xii; it inhabits the Siluri(2).

The following genus, which, when we are furnished with more complete details of its economy, will have to be divided into several genera, we think should be placed after the Intestinal Worms of this order, but as a different family.

LERNÆA, Lin.

Where the internal and external organization of the body is nearly the same as in the Nematoidea; but it is prolonged anteriorly by a corneous neck, at the extremity of which is a mouth variously armed and surrounded, or followed by productions of different forms. This mouth and its appendages are insinuated into the skin of the gills of fishes, and fix the animal there. The Lerneæ are also distinguished by two cords, sometimes moderate, and at others very long, or even much doubled, that are pendent from the sides of the tail, and which may possibly be ovaries(1).

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(1) The mouth of the LINGUATULÆ, Froelich, is exactly similar to that of this Pentastoma; I consequently presume that they belong to the same genus, although I could not examine their intestines on account of their minuteness. Such are the *Tænia caprina*, Gm., or the *Polyst. denticulatum*, Rud., Zool. Dan., III, cx, 4, 5;—*Linguatula serrata*, Gm.; *Pol. serratum*, Rud.; Froel., Nat. Forsch., XXIV, iv, 14, 15; the same as the TETRAGULA, Bosc., Bullet. des Sc., May 1811, pl. ii, f. 1. These Worms now constitute the genus PENTASTOMA of Rudolphi, Syn., 123. M. de Blainville prefers the name of LINGUATULE. The *Porocephalus crotali*, Humb., Obs. Zool., pl. 26, probably belongs to the same genus.

(2) These two genera form the order ENTOMOZOAIRES APODES ONCHOCEPHALES of M. de Blainville.

LERNÆA proper.

Where the body is oblong, furnished with a long and slender neck, and a sort of horns round the head.

L. branchialis, L.; Encyc. Vers, LXXVIII, 2. The most known species; it attacks the Codfish and other Gadi, and is from one to two inches in length. Its mouth is surrounded by three ramous horns, which, as well as the neck, are of a deep brown. Its more inflated body is bent into an S, and the two cords are contorted in a thousand different ways. Its horns become rooted, as it were, in the gills of fishes. Another, the

L. ocularis, Cuv., fastens itself to the eyes of Herrings and other fishes; its horns are simple and short, two larger and two smaller; the body is slender, and its cords long and not doubled(2).

L. multicornis, Cuv., is another with very numerous, small, and unequal horns, found on the gills of a Serranus in the East Indies.

In another group,

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(1) M. Surrirey found ova in these cords of a Lernæa, which (ova) appeared to him to contain an animal, analogous to one of the Crustacea, and very different from the Lernæa itself. This fact, added to the observations of Messrs Audouin and Milne Edwards, relative to the *Nicothoe astaci*, has inclined those naturalists to the opinion that most of these Lernææ may be Crustacea that have become monstrous subsequent to being fixed, and that the males remain free, which, according to them, explains the circumstance of our being able to find females only— Ann. des Sc. Nat., IX, 345, pl. xlix. Before this idea can be received as definitive, we must be able to find these males.

(2) Add *L. cyprinacea*, L.; Faun. Suec., 1st edit., fig. 1282; Encyc., Vers. LXXVIII, 6;—*L. surrirensis*, Blainv.;—*L. lotæ*, Herm., Nat. Forsch., XIX, 1, 6? —*L. cyclopterina*.

This group is called LERNEOCERES by M. de Blainville.

Pennella, Oken,

The head is inflated, the nape furnished with two small horns, and the neck corneous; the body is long, transversely rugose, and provided posteriorly with little filaments arranged like the laminæ of a feather. The two very long filaments arise from the commencement of this plumous portion.

P. filosa; Pennatula filosa, Gmel.; Boccone, Mus., 286; Ellis, Phil. Trans., LXIII, xx, 15. From seven to eight inches in length; it penetrates into the flesh of the Xiphias, Thynnus, and Orthagoriscus, tormenting them horribly. It is found in the Mediterranean(1).

In a third group,

Sphyrion, Cuv.

The head is widened on each side like a hammer, and the mouth is furnished with hooks; the neck is slender, and followed by a depressed and cordiform body, which, besides the two long cords, is provided with a thick bundle of hairs(2).

In a fourth,

Anchorella, Cuv.

The animal is only fixed to the gills by a single production, which originates underneath the body, and is directed posteriorly(3).

In a fifth,

Brachiella, Cuv.

We observe two prominences somewhat similar to two arms, which unite in one corneous body, by which the animal fastens itself to the gills(4).

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(1) Add *Lernæa cirrhosa*, la Martin., Journ. de Phys., Sept. 1787, ii, 6;—*Pennella diodontis*, Chamiss., and Eisenhardt, Act. Nat. Cur., pars II, pl. xxiv, f. 3.

(2) The *Chondracanthe lisse*, Quoy and Gaym., Voy. de Freycin., Zool. pl. LXXXVI, f. 10.

(3) *Lernæa adunca*, Stroem., Sondmoer., pl. i, f. 7, 8; common on several Gadi.

(4) *Brachiella thynni*, Cuv. Règn. Anim., pl. xv, f. 5;—*Lernæa salmonea*, Gisler;

In a sixth,

Clavella, Oken,

We find none of these appendages, the animal merely fastening itself by the mouth(1).

In these three last groups the hooks of the mouth are well marked; their strings are but slightly elongated, and sometimes the posterior portion of the body is provided with other appendages.

In consequence of a recent examination, I place here the

Chondracanthus, Laroch.

Where the mouth is also furnished with hooks, and the sides of the body with appendages, so extremely various as to form and number, that in process of time we shall have to subdivide them.

Thus, in some, we observe on each side two sorts of arms more or less elongated(2).

In others there are several pairs partly forked(3), or even more ramous(4).

Some again have a slender neck, and a wide body slashed on the edges(5).

Act. Suec., 1751, and Encyc. Méthod., Vers, pl. LXXVIII, f. 13, 18;—*L. Pernettiana*, Blainv.; Pernetti, Voy. aux Malouines, I, pl. i, f. 5, 6—two badly figured species. The *L. huchonis*, Schrank., Trav. in Bav. pl. I, f. A, D, is still worse. There are several others.

I think that this and the preceding group will re-enter the Lerneomyzæ, Blainv., which in that case must be differently defined.

(1) *Lernæa uncinata*, Müll., Zool. Dan., I, xxxiii, 2;—*L. clavata*, Id., Ib., i. These Clavellæ of Oken form the Lernæa proper of M. de Blainville.

(2) *Lernæa radiata*, Müll., Zool. Dan., XXXIII, 4;—*L. gobina*, Id., Ib., 3. The first is the type of the genus Anones, Oken.

(3) *Lernæa cornuta*, Id., Ib., 6, and several new species.

(4) *Chondracanthus zei*, Laroche, Bullet. des Sc., May 1811, pl. 2, f. 2.

(5) *Lernæa triglæ*, Blainv., Dict. des Sc. Nat., xxvi, p. 325; Cuv. Règn. Anim., pl. xv.

N.B. M. de Blainville arranges my Chondracanthi in his genera Lernentome, Lernacanthe and Lernanthrope.

N.B. The *Lernæa pectoralis*, Müll., Zool. Dan., XXXIII, f. 1, is a Calygus, and the *L. asellina*, It. West. Goth., III, 4, also seems to be one of the same, but disfigured.

At the end of this order I also place an animal which approaches it in several respects, but which may one day serve as the type of a new one. It forms a genus which I have named

NEMERTES, Cuv.

It is an extremely soft and elongated worm, smooth, slender, flattened and terminated at one extremity by a blunt point, pierced by a hole; the other end, by which it fastens to its prey, is widened and very open. Its intestine traverses the whole length of the body. A second canal, probably connected with the process of generation, serpentines along its parietes and terminates in a tubercle on the margin of the wide opening. Messrs d'Orbigny and de Blainville, who saw the animal while alive, assure us that the wide aperture is its mouth.

N. Borlassi, Cuv.; Borl., Cornw., XXVI, 12, is more than four feet in length. It remains buried in the sand, and, it is said, attacks the Anomiæ which it sucks in their shell(1).

In the vicinity of Nemertes should probably be placed the

TUBULARIA, Renieri,

Equally large and extremely elongated, but furnished with a small mouth opening under the anterior extremity.

OPHIOCEPHALUS, Quoy and Gaym.

With the same form but the extremity of the mouth cleft.

CEREBRATULA, Renieri.

Which seems only to differ in the greater shortness of the body(2).

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(1) For this singular worm, which is mentioned by Borlasse only, I am indebted to M. Dumeril who found it near Brest. It is the genus BORLASIA of Oken; M. Sowerby had previously called it LINEUS.

(2) We have neither seen the Tubularia nor Cerebratula. The names of Tubularia and Ophiocephalus, being already applied to other genera, cannot subsist.

ORDER II.

PARENCHYMATA.

The second order of the Entozoa comprises those species in which the body is filled with a cellular substance or even with a continuous parenchyma, the only alimentary organ it contains being ramified canals, which distribute nourishment to its different points, and which, in most of them, originate from suckers visible externally. The ovaries are also enveloped in this parenchyma or that cellulosity. There is no abdominal cavity, nor intestine properly so called; the anus is wanting, and if we except some equivocal vestiges in the first families, there is nothing to be found which bears a resemblance to nerves.

We may divide this order into four families.

FAMILY I.

ACANTHOCEPHALA.

The Parenchymata of this family attach themselves to the intestines by a prominence armed with recurved spines, which also appears to act as a proboscis. They form the single genus

ECHINORHYNCHUS, Gm.

Where the body is round, sometimes elongated, and sometimes in the form of a sac, provided anteriorly with a prominence in the form of a proboscis armed with little hooks bent posteriorly, and susceptible of being retracted or protruded by the action of particular muscles. At its extremity we sometimes observe a papilla or pore which may be an organ of absorption, but it is certain that if the animal be plunged into water it becomes universally distended, and absorbs that liquid through the whole surface, on which it is thought we can discover a network of absorbent vessels. No other parts that can be compared to intestines are visible internally, than two slightly elongated cæca attached to the base of the tubiform prominence; a vessel extends throughout its length on each side. A thread that runs along the inferior face of the animal is considered by M. de Blainville as its nervous system; but neither Rudolphi nor Cloquet coincide with him. Certain species have a distinct oviduct; in others the ova are disseminated throughout the cellulosity or parenchyma of the body. The males are provided with a little bladder at the end of the tail, and very distinct internal vesiculæ seminales. We may believe that they fecundate the ova after they are extruded.

These worms cling to the intestines by means of their proboscis, and frequently penetrate through them, so that individuals are sometimes found in the thickness of their tunics, and even in the abdomen, adhering to their external parietes.

E. gigas, Gm.; Gœtz., X, 1—6; Encyc. XXXVII, 2—7. The largest species known; it inhabits the intestines of the Hog and Wild Boar, where the females attain a length of fifteen inches(1).

Certain species, in addition to the prickles on their proboscis, are armed with them in some other part of the body.

HÆRUCA, Gm.

Only differing from Echinorhynchus in the prominence, which is reduced to a single crown of spines, terminated by double hooks.

H. muris, Gm.; *Echinorhynchus hæruca*, Rud.; Gœtz., IX, B., 12; Encyc., Vers, XXXVII, 1(2). It inhabits the liver of Rats.

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(1) For the other species, see Rud., Hist. II, 251, and Syn., p. 63.

(2) Id., Ib., 292, et seq.

FAMILY II.

TREMADOTEA, Rud.

Our second family comprises those which are furnished underneath the body, or at its extremity, with organs resembling cupping-glasses, by which they adhere to the viscera.

They may all be united in one genus, or the

FASCIOLA, Lin.

Which may be subdivided in the following manner, according to the number and position of their organs of adhesion.

FESTUCARIA, Schr.—MONOSTOMA, Zed.

Where there is but one of those organs, sometimes at the anterior extremity and sometimes underneath the same end. Found in various Birds and Fishes(1).

STRIGEA, Abild.—AMPHISTOMA, Rud.

Where there is a cup at each extremity. Found in various Quadrupeds, Birds, &c.(2)

To this subgenus we must probably approximate the

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(1) Rud., Hist., II, p. 325, and Syn. 82; the HYPOSTOMA, Blainv., are a division of the same, with a depressed body, and cups placed under the anterior extremity. Van Hasselt and Kuhl have discovered two new species in the *Chelonia midas*, Bullet. of Féruss., 1824, vol. II, p. 311.

(2) Rud., Hist., p. 340, and Syn., p. 87.

Caryophyllæus, Bl.

Where the head is dilated, fringed and furnished underneath with a bilabiate sucker, not easily perceived. A second and similar sucker has been occasionally seen underneath the tail.

One species is known, which inhabits various fresh-water Fishes, and particularly the Bream(1).

Distoma, Retz and Zed.

Where there is a sucker at the anterior extremity of the mouth, and a cup, a little posterior to it, on the venter.

The species are very numerous, and some are found even in the plaited membrane of the eyes of certain Birds. Others, however, appear to inhabit fresh and salt water. The most celebrated is

D. hepatica; Fasciola hepatica, L.; Schœff., Monog., copied Encyc., Vers, pl. lxxx, 1—11. It is very common in the hepatic vessels of Sheep, but is also found in those of various other Ruminantia, and of the Hog, Horse, and even of Man. Its form is that of a small oval leaf, pointed posteriorly, with a narrowed portion anteriorly, at the end of which is the first sucker, which communicates with a sort of esophagus, from which arise canals that ramify throughout the body, conveying the bile on which this animal feeds. Behind the sucker is a little retractile tentaculum, which is the penis, and posterior to that, the second sucker; extremely flexuous vesiculæ seminales fill up the centres of the leaf. The ovary, which is found in every individual, is set in the intervals of the intestines, and the ova issue through a flexuous canal that opens exteriorly by a small hole by the side of the penis. These animals enjoy a mutual coitus.

The species that infest Sheep become greatly multiplied when they graze in low and wet grounds, rendering them dropsical, and finally killing them(2).

M. Rudolphi, under the name of Echinostoma, makes a division of those species which have a slight tubercle or swelling, anteriorly armed with hooks(1).

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(1) Id., Hist., pars II, 9, and Syn., p. 127.

(2) For the other species, see Rud., Hist., II, pars I, p. 357, and Syn., 92. For their organization, see *Observationes Anat. de Distomate hepatico et lanceolato* of Ed. Mehlis, Gotting., 1825, in folio.

HOLOSTOMA, Nitz.

Where one half of the body is concave, and so arranged as to act altogether like a cup. Their orifices appear to be similar to those of Distoma.

They inhabit certain Birds. One species is found in the Fox. In

POLYSTOMA, Zed.,

Or rather Hexastoma, the body is depressed, smooth, and furnished with six cups arranged in a transverse line, under the posterior margin. The mouth appears to be at the opposite extremity.

They have been found in the urinary bladder of Frogs, in the ovary of Woman, on the branchiæ of some Fishes(2), and in the nasal cavity of certain Tortoises.

CYCLOCOTYLE, Otto.

Where there are eight cups forming an almost complete circle, under the hind part of the body, which is broad; there is a small proboscis anteriorly.

C. belone, Otto, Ac. Nat. Cur. XI, part II, pl. xli, f. 2. The only species known; it is very small, and was taken on the back of the Belone vulgaris.

There is another subgenus that approximates to Fasciola, which I have named

TRISTOMA, Cuv.

The body forms a broad and flat disk; on the posterior part of its inferior surface is a large cartilaginous sucker which is only connected with the body by a short pedicle, and under its anterior margin are two small ones, between which, and somewhat posteriorly, is the mouth. A circular ramified vessel, the nature of which it is difficult to determine, is observable in the parenchyma of the body.

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(1) The genus ECHINOSTOMA of Blainville.

(2) *Polyst. integerrimum*, Rud., pl. vi, 1—6, genus HEXATHIRIDIA, Trentler;—*P. pinguicola*;—*P. thynni*, Laroche, Nouv. Bull. de Sc., May 1811, pl. ii, f. 3, genus HEXACOTYLE of Blainville;—*Pol. midas*, Kuhl and Van Hasselt, Allg. Koust. en Latterbode, No. 6, and the Bullet. des Sc. Nat. de Féruss., 1824, vol. II, p. 310.

T. coccineum, Cuv., a species more than an inch wide, and of a bright red colour, that attaches itself to the branchiæ of various fishes of the Mediterranean, such as the Orthagoriscus, Xiphias, &c.(1)

One of the most extraordinary genera of this family is the

HECTOCOTYLE, Cuv.

Long worms, thickest and compressed at the anterior extremity, in which is the mouth, whose inferior surface is completely covered with numerous suckers arranged in pairs, to the number of sixty or a hundred; there is a sac on the posterior extremity with the folds of the oviduct.

H. octopodis, Cuv., Ann. des Sc. Nat., XVIII, pl. xi. From four to five inches long, and with a hundred and four suckers or cups; it lives on the Octopus rugosus—*Sepia rugosa*, Bosc—and penetrates into its flesh. The Mediterranean.

H. argonautæ; Trichocephalus acetabularis, Delle Chiaie Mem., p. ii, pl. 16, f. 1, 2. Smaller and with but seventy suckers. It lives on the Argonaut.

Here perhaps should come the genus

ASPIDOGASTER, Bær.

Where the venter is furnished with a lamina excavated by four ranges of fossulæ.

A. conchicola, Bær., Ac. Nat. Cur. XIII, p. ii, pl. xxviii. It is very small and lives on Muscles.

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(1) Lamartinière found a similar but grey one on a Diodon near Nootka-Sound. It formed the genus CAPSALA, Bosc., Nouv. Bullet. des Sc., 1811, and that of PHYLLINE, Oken, Zool., pl. x. See Journ. de Phys., Sept. 1787, pl. ii, f. 4, 5. We may unite to it the *Tristoma elongatum*, Nitzsch, or NITSCHIA, Bær., Ac. Nat. Cur., XIII, pars II, tab. XXXII, f. 1—5. The AXINE of the Belone, Abild., Soc. Nat. Hist. Copenh., III, p. 2, pl. vi, f. 3, appears to be a Tristoma, with an extremely elongated body, very large posterior suckers, and very small anterior ones.

I cannot help thinking that we should also approximate to Fasciola most of the animals contained in the genus

PLANARIA, Mull.(1)

Although they do not inhabit other animals, but merely live in salt or fresh water. Their body is depressed, parenchymatous, and without a distinct abdominal cavity. The oral orifice, placed under the middle of the body, or more posteriorly, and dilated into a little proboscis, leads, as in Fasciola, to an intestine whose numerous ramifications are formed in the thickness of the body. A vascular network occupies the sides, and behind the alimentary orifice is a double system of genital organs. They also enjoy a reciprocal coitus. Small black points are observable, which probably are eyes.

These animals are extremely voracious, and do not even spare their own species. They not only multiply in the ordinary manner, but are reproduced with great facility by division. They even experience spontaneous divisions.

Several species inhabit the fresh waters in France(2).

Others, and larger ones, are very abundant on the sea-coast of the same country(3).

The surface of some seems pilose(4).

Several are furnished anteriorly with two tentacula(5).

M. Dugès separates from them the

PROSTOMA,

Where the anterior extremity is provided with an orifice, and the posterior with another.

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(1) At the period of my first edition, it was by conjecture only that I placed the genus Planaria here, having no sufficient anatomical data to give me an idea of its natural affinities. Since then, the observations of MM. R. Johnson, Phil. Trans., Dallyell, Monog., Bær., Ac. Nat. Cur., XIII, Dugés, Ann. des Sc. Nat., XV, and those made by myself, appear to confirm this classification, which has been adopted by M. de Lamarck.

(2) *Planaria lactea*, Zool. Dan., CIX, 1, 2;—*Pl. nigra*, Ib., 3, 4, and the other species described by M. Dugés, Ann. des Sc. Nat., XV, pl. iv. We find in Gmelin the long catalogue of this genus, which Müller particularly has enriched; part of this savant's figures are copied in the Encyc. Méthodique.

(3) *Pl. aurantiaca*, Cuv.

(4) *Pl. brocchii*, Risso.

(5) *Pl. cornuta*, Müll., Zool. Dan., XXXII, 5, 7. Some of them are formed by tearing the tentacula, under the eye of the spectator. The *Planocères*, Blainv., belong to this division.

DEROSTOMA.

Where the oral orifice is underneath but nearer to the anterior extremity.

It is to the first that I approximate the PHÆNICURUS, Rud., or VERTUMNUS, Otto, in which there is but one orifice at the anterior extremity.

But one species is known—*V. thethidicola*, Otto. Ac. Nat. Cur., XI, part II, pl. xli, f. 2—a parasite of the *Thethys fimbria*; it is marbled, and frequently has a forked tail so shaped by being torn(1).

FAMILY III.

TÆNIOIDEA.

In our third family of parenchymatous Intestinal Worms, we place all those species in which the head is provided with two or four suckers placed around its middle, which is itself sometimes marked with a pore, and sometimes furnished with a little proboscis, naked or armed with spines. Sometimes there are four little trunks thus armed.

The most numerous genus is

TÆNIA, Lin.

The body of the *Tape-worm* is often excessively elongated, flat, composed of joints more or less distinctly marked, and narrowed anteriorly, where we generally find a square head hollowed by four small suckers.

Observers have thought that they could perceive canals which arose from these suckers, and crept along the margin of the joints of the body. Each of the latter has one or two pores differently situated, according to the species, which appear to be the orifices of ovaries that are placed in the thickness of the joints, where they are sometimes simple, and at others ramous. The Tæniæ are among the most cruel enemies of the animals in which they are developed, and which are apparently exhausted by them.

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(1) For its anatomy, see Delle Chiaie, Memor., I, pl. ii, f. 9, 5.

In some, there is no projecting part in the four suckers. Such in Man is the

T. lata, Rud.; *T. vulgaris*, Gm.; Gœtz., XLI, 5—9. (The Common Tape-worm.) The joints are broad, short, and furnished with a double pore in the middle of each side. It is very frequently twenty feet in length, and it has been found upwards of a hundred. The large ones are nearly an inch wide, but the head and anterior portion of the body are always very slender. This species is extremely injurious and tenacious. The most violent remedies frequently fail to expel it.

In others, the prominence between the suckers is armed with little radiating points. Such is the

T. solium, L.; Gœtz., XXI, 1—7; Encyc., XL, 15—22, and XLI, 1—7; *Ver solitaire* of the French. Its joints, the anterior ones excepted, are longer than they are wide, and have the pore placed alternately on one of their edges. It is usually from four to ten feet in length, but much larger ones are sometimes met with. The vulgar idea that but one of these animals is found at a time in the same individual is very far from being true. Its detached joints are styled *cucurbitini*. It is one of the most dangerous of the intestinal worms and the most difficult to expel(1).

From these ordinary Tæniæ, on account of the form of their head, are distinguished the

TRICUSPIDARIA, Rud.

Now called Trianophora by the same author, where the head, divided as it were into two lips or lobes, instead of suckers, has two tri-pointed spinuli or stings, on each side.

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(1) For the other species, see Rud., Hist., II, 77, and Syn., 144.

But a single species is known, the *Tænia nodulosa*, Gm.; Gœtz., XXXIV, 5, 6; Encyc., XLIX, 12—15. It inhabits various fishes, the Pike, Perch, &c.(1)

BOTHRYOCEPHALUS, Rud.

Where the only suckers possessed by the head are two longitudinal fossulæ placed opposite to each other.

They are found in different Fishes and in certain Birds(2).

From the Bothryocephali themselves should be distinguished the

DIBOTHRYORHYNCHUS, Blainv.

Where the summit of the head is provided with two little trunks or tentacula bristled with hooks.

But a single species is known; it has a short body and inhabits the Lepidopus, Blainv., App. ad Brems., pl. ii, f. 8.

FLORICEPS, Cuv.

Where there are four little trunks or tentacula armed with recurved spines by means of which they penetrate into the viscera.

Certain species—RHYNCHOBOTHRIUM, Blainv.—have a long, articulated body destitute of a bladder.

One species is common in the Rays—*Bothryocephalus corollatus*, Rud., IX, 12—that is some inches in length. Its head is the exact resemblance of a flower.

In others again—FLORICEPS proper(3)—the body is terminated by a bladder into which it withdraws and is concealed.

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(1) Rud., Hist., II, part II, 32, and Synop., 135.

(2) Rud., Hist., II, p. ii, 37, and El., 136. For the genus Bothryocephalus and its subdivisions, see the *Zoological Fragments* of F. S. Leuckardt, No. 1, Helmstædt, 1819.

(3) M. Rudolphi has changed this name to ANTHOCEPHALUS, El., 177.

TETRARHYNCHUS, Rud.

The Tetrarhynchi merely appear to be Floriceps naturally reduced to the head and two joints, instead of having an elongated and pluri-articulated body.

T. lingualis, Cuv. Very common in the tongue of the Turbot, and of several other fishes(1).

TENTACULARIA, Bosc.

Only differ in consequence of the tentacula being unarmed.

Naturalists have also distinguished from the ordinary Tæniæ those, which, with a similar head, that is one with four suckers, have the body terminated posteriorly by a bladder. Their joints are not as distinctly marked as in the preceding ones. The genus

CYSTICERCUS, Rud.

Vulgarly termed *Hydatids*, is composed of those in which the bladder supports but a single body and one head. They are particularly developed in the membranes and cellulosity of animals.

C. globosus; Tænia ferarum, T. caprina, T. ovilla, T. vervecina, T. bovina, T. apri, T. globosa, Gm.; Gœtz., XXII, A. B; Encyc., XXXIX, 1, 5. This species is found in a great number of Quadrupeds, the Ruminantia especially.

C. pisiformis; Tænia cordata, T. pisiformis, T. utricularis, Gm.; Gœtz., XVIII, A, B; Encyc., XXXIX, 6, 8. Very common in the Hare and Rabbit.

C. cellulosæ; Tænia cellulosæ, T. finna, Gm.; Blumenb., Abb., fascic. IV, pl. 39. This species is the most celebrated of the whole number, and lives between the fibres of the muscles of the Hog, producing the disease called *measles*. It is small, and multiplies prodigiously in this disgusting disease, penetrating into the heart, eyes, &c. Similar animals have, it appears, been observed in certain Monkeys and even in Man, but theyare said to be never found in the Wild Boar(1).

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(1) For this genus, see Rud., Hist., II, 318, and Syn., 129.

The Acrostoma, Le Sauvage, Ann. des Sc. Nat., is closely allied to this genus. The animal inhabits the amnios of the Cow.

Cœnurus, Rud.

Here we find several bodies and heads adhering to the same bladder.

C. cerebralis; *Tænia cerebralis*, Gm.; Gœtz., XX, A, B; Encyc., XL, 1—8. This celebrated species is developed in the brain of Sheep, destroys a portion of its substance, and produces a disease called the Staggers (*tournis*), because it compels them to turn on that side as if affected with vertigo. The same species has been observed in the Ox and other Ruminantia, where it produces similar effects. Its bladder is sometimes as large as an egg, and its parietes are thin, fibrous, and exhibit evident contractions. The little worms are hardly half a line in length and re-enter the bladder by contraction(2).

Scolex, Mull.

Where the body is round, pointed behind, extremely contractile, and terminated before by a sort of variable head, round which are two or four suckers, sometimes resembling ears or ligulæ. Those that are known are very small and inhabit fishes(3). I have seen a large one,

S. gigas, Cuv.; *Gymnorhynchus reptans*, Rud., Syn., 129, which penetrates into the flesh of the *Sparus raii*, L. The middle of its body is inflated into a bladder, which, during the life of the animal, alternately widens and contracts in the middle.

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(1) For the remaining species, see Rud., Ent., II, p. ii, p. 215, and El., 179.

(2) Here should probably come the genus Echinicoccus, Rud., II, p. ii, 247, but I have not seen it, and have no idea of it sufficiently clear to enable me to class it.

(3) See Rud., Hist. II, p. 3, and Syn., 128.

FAMILY IV.

CESTOIDEA.

The fourth family comprises those which are destitute of external suckers.

But one genus is known.

Ligula, Bloch.

Of all the Entozoa, these appear to be the most simply organized. Their body resembles a long riband; it is flat, obtuse before, marked with a longitudinal stria, and finely striated transversely. No external organ whatever is perceptible, and internally we find nothing but the ova, variously distributed in the length of the parenchyma.

They inhabit the abdomen of certain Birds, and particularly of various fresh-water Fishes, enveloping and constricting their intestines to such a degree as to destroy them. At certain periods they even perforate the parietes of their abdomen to leave it. One of them,

L. abdominalis, Gm.; *L. cingulum*, Rud.; Gœtz., XVI, 4—6, inhabits the Bream(1). In some parts of Italy these worms are considered agreeable food.

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(1) For the others, see Rud., Hist., II, p. II, p. 12, and Syn., 132.

N.B. In the intestines of Seals, and of Birds that prey on Fishes, we find Worms very similar to the Ligulæ, but with genital organs, and even a head analogous to that of the Bothryocephali. M. Rudolphi supposes that these Worms of Birds are the same as the Ligulæ of Fishes, which can only acquire their full development after they have passed from the abdomen of the latter into the intestines of the former.

CLASS III.

ACALEPHA.

Our third class comprises Zoophyta which swim in the waters of the ocean, and in whose organization we can still perceive vessels, which, it is true, are generally mere productions of the intestines excavated in the parenchyma of the body.

ORDER I.

SIMPLICIA.

The simple Acalepha float and swim in the ocean by the alternate contractions and dilatations of their body, although their substance is gelatinous and without any apparent fibres. The species of vessels observed in some of them are hollowed out of their gelatinous substance; they frequently and evidently originate from the stomach, and do not occasion a true circulation.

MEDUSA, Lin.

The Medusæ are furnished superiorly with a disk more or less convex, resembling the head of a mushroom, and called the *umbella*. Its contractions and dilatations assist the locomotion of the animal. The edges of this umbella, as well as the mouth, or the suckers more or less prolonged into pedicles which supply the want of it, in the middle of the inferior surface, are furnished with tentacula of various forms and very different sizes. These various degrees of complication have given rise to numerous divisions(1).

We will designate by the general name of

MEDUSA,

Or Medusa proper, those which have a true mouth in the middle of the inferior surface, either simply open at the surface or prolonged into a pedicle.

Under the name of

ÆQUOREA,

We may reunite those in which this mouth is simple and not prolonged, nor furnished with arms.

When there are no tentacula round the umbella they constitute the PHORCYNIA of Lamarck(2).

When the circumference of the umbella is furnished with tentacula we have the ÆQUOREA proper—ÆQUOREA of Péron—one of the most numerous of all the subgenera, particularly in the seas of hot climates(3).

Certain species are remarkable for having their inferior surface covered with laminæ, and others—FOVEOLIA, Péron—for little fossulæ, which are placed round the circumference of the umbella(1).

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(1) For this genus, see the Prodromus of Péron and Lesueur, Ann. du Mus., XIV, and XV; it is well to remember that their genera are frequently founded on bad figures, such as those of Baster and Borlasse and without having seen the animals; and that they have increased the number of species beyond all bounds.

(2) The *Phorcini* and *Eulimenes* of Péron.

(3) *Medusa æquorea*, Gm.; Forsk., XXXI; Encyc., Vers, XCV, 1; *Æquorea mesonema*, Péron; Forsk., XXVIII, B;—*Med. mucilaginosa*, Chamiss., and Eisenh., Ac. Nat. Cur., X, part I, pl. xxx, f. 2, and the species engraved by M. Lesueur and indicated by Péron, Ann. du Mus., XV, and by M. de Lamarck, Hist., des Anim. sans vert., II, 498, et seq. It is to be regretted that these plates are not to be purchased. I also add to them the PEGASIA, and MELITEA of Péron.

We might also unite under the name of

PELAGIA,

Those in which the mouth is prolonged into a peduncle or is divided into arms(2).

In all these subgenera there are no lateral cavities, but in a much greater number of these Medusæ with a simple mouth, we find, in the thickness of the umbella, four organs formed of a plaited membrane, which at certain seasons are filled with an opaque substance, and which appear to be ovaries. They are usually placed in as many cavities opening on the inferior surface, or on the sides of the pedicle, and which have been erroneously (in my opinion) taken for mouths, because little animals are sometimes entangled in them(3). Others consider them as organs of respiration(4), but that function is most probably exercised by the edges of the umbella. The tentacula, whether situated on the margin of the umbella or round the mouth, vary, not only according to the species, but the age of the animal(5).

We will unite, under the name of

CYANÆA, CUV.

All the Medusæ with a central mouth and four lateral ovaries.

C. aurita; Medusa aurita, L.; Müll., Zool. Dan. LXXVI, and LXVII. One of the most commonly disseminated species, acquiring with age four long arms; the whole circumference of its umbella is finely ciliated; reddish branching vessels proceed from the stomach to its circumference. In the

C. chrysaora; Med. chrysaora, Cuv., the edges are furnished with long tentacula or fulvous or brown lines or spots arranged in radii on its convexity. This species also is extremely common, and varies greatly as to the spots(1).

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(1) *Medusa mollicina*, Forsk., XXXIII, C; Encyc., XCV, 1, 2;—*Medusa perla*, the genus MELICERTE, Péron.

(2) *Pelagia panopyra*, Péron, Voy. aux Terres Aust., XXXI, 2; the CALLIRHOE and EVAGORA, Pér., should also be united to it.

(3) This opinion of Baster and Müller induced Péron to divide a portion of these Medusæ into Monostoma and Polystoma.

(4) Eisenh., on the *Rhisostoma*, &c.

(5) See Müll., Zool. Dan., II, p. 51.

We have given the general name of RHIZOSTOMA to that portion of the great genus Medusa which comprises species that have no mouth opening in the centre, and that appear to live by the suction exercised by their pedicles or tentacula. They have four or more ovaries.

RHIZOSTOMA, proper,

Includes those which are furnished with a central pedicle more or less ramified according to the species.

The vessels arising from the small ramifications of the pedicles unite in a cavity of its base, whence branches proceed to all parts of the umbella.

The most common species is the *Rhizostome bleu*, Cuv., Journ. de Phys., XLIX, p. 436; Réaum., Ac. des Sc., 1710, pl. XI, f. 27, 28. It is found along the French coast at low water, and its umbella is sometimes almost two feet in width. Its pedicle is divided into four pairs of arms almost infinitely forked and dentated, each one being furnished at base with two auricles that are also dentated; a fine network of vessels extends round the umbella in the thickness of its margin(2).

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(1) Most of the Chrysaora of Péron are mere varieties of this species.—Add *Aurelia crenata*, Chamiss., and Eisenh., Ac. Nat. Cur., X., p. I, pl. xxix.

Besides the Chrysaora, we refer to this genus the AURELIA, CYANEA, OBELIA and OCEANIA of Péron: we also include in it *Medusa hemispherica*, Müll., VII, 5; Encyc., 93, 8, 11;—*M. cymbaloides*, Slaber., Encyc., Ib., 2—4, if we may trust to the characters of such small individuals;—*Callirhoe basteriana*, Pér.; Baster, Op. Subs., II, v, 2, 3; Encyc., XCIV, 4, 5;—the *Cyanée bleu*, Pér.; Diquemare, Journ. de Phys., 1784, Dec. I;—the species or varieties figured, but rudely, by Borlasse, Nat. Hist. of Cornw., pl. xxv, f. 7—12, which are referable to our Chrysaora, and to which should be approximated the *Med. hysocella*, Gm.;—*M. tyrrhena*, Gm., &c.

(2) It is the *Pulmo marinus*, Mathiol., Aldrov., Zooph., lib., IV, p. 575, the *Medusa pulmo*, Gm., Macri, Polm. Mar., I, B; Borlasse, XXV, 15. See Eisenh., Ac. Nat. Cur., X, part II, p. 377.

The *Potta marina*, Aldrov., Ib., p. 576, is perhaps another species.

I suspect that the EPHIRA, Pér.,—*Medusa simplex*, Pennant; Borlasse, Cornw., XXV, 13, 14—is merely a Rhizostoma deprived of its pedicle.

The *Medusa pileata*, Forsk., of which Péron makes an *Oceania*, has the ramous pedicle of Rhizostoma proper, but enclosed under a campanulate umbella, furnished at the margin with tentacula.

According to the observations of Messrs Audouin and Milne Edwards, these Medusæ live in society, or at least are always met with collected in great numbers and swimming in the same direction with their body inclined obliquely.

The CEPHEÆ, Pér., are only distinguished from the other Rhizostoma by having filaments intermixed with the dentations of the pedicle(1).

The CASSIOPEÆ have no pedicle, properly so called; their (usually eight) arms, which are sometimes ramous, arise directly from the inferior surface(2).

In other species, without a central mouth, we find none of those numerous ramifications in the pedicle, nor open cavities for lodging the ovaries. They might be united under the name of

ASTOMA.

Some however—LYMNOREA and FAVONIA, Pér.—still have a large pedicle furnished on each side with fibrous filaments which may act as suckers.

Others—GERYONIA, proper, Pér.—are even destitute of these filaments, but have an infundibuliform membrane at the extremity of the pedicle, from the bottom of which vessels seem to arise that ascend into the pedicle and spread out through the umbella.

One of them is found in the Mediterranean, the *Med. proboscidalis*, Forsk., XXXVI, 1(3).

ORITHYIA, Pér.

Where that membrane is wanting(4).

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(1) *Medusa cephæa*, Forsk., XXIX; Encyc., XCII, 3, 4;—*Med. octostyla*, Id., XXX; Encyc., Ib., 4;—*Med. ocellata*, Modeer., Nov. Act. Holm., 1791.

(2) *Med. frondosa*, Pall., Spic., X, ii, 1, 3;—*Med. octopus*, Gm.; Borlasse, XXV, 16, 17;—*Med. andromeda*, Forsk., XXXI?—*Med. corona*, Id., p. 107?—*Rhizostoma leptopus*, Chamiss. and Eisenhardt, Ac. Nat. Cur., X, p. I, pl. xxviii, f. 1;—*Cass. borbonica*, Delle Chiaie, Mem., I, tab. 3, 4.

(3) Add *Dianée Gabert*, Zool, Freycin., pl. 84, f. 2; *Geryonia tetraphylla*, Chamiss. and Eisenh., loc. cit. f. 2.

(4) *Medusa minima*, Baster, Op. Subs., II;—*Dianée dubaul*, Zool., Freycin., pl. 84, f. 3, which is the *Geryonie dinéme*, Pér. It is possible that mutilated Geryoniæ (which are often in that condition) may have been taken for Orythyiæ.

BERENIX, Pér.(1)

Where there is no pedicle whatever, but where the inferior surface appears to be provided with little suckers along the track of the vessels(2).

EUDORA, Pér.

Where not even suckers are visible, but where the two surfaces are smooth and without any apparent organs.

One species is found in the Mediterranean—*Eudora moneta*, Cuv.—about the size of a five-franc piece, and so called by the people.

When these simple animals become more concave, their inferior surface becomes an interior one and may be considered as a true stomach. They form the

CARYBDEA, Pér.

Those, in which no traces of vessels can be perceived internally, only differ from *Hydra* in size.

We should separate from the Medusæ, certain genera united with them by Linnæus from insufficient affinities.

BEROE, Müll.

Where the oval or globular body is furnished with salient ribs covered with filaments or a sort of lace, extending from one pole to the other, and in which ramifications of vessels are perceptible and a kind of motion resembling that of a fluid. The mouth is at one extremity; in those that have been examined they lead into a stomach that occupies the axis of the body, and on the sides of which are two organs probably analogous to those we have styled ovaries in the Medusæ. Such is the

B. pileus; Medusa pileus, Gm.; Baster, I, III, xiv, 6,7; Encyc.

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(1) *Cuvieria carisochroma*, Pér., Voy. aux Terres Aust., XXX, 2.

(2) *Medusa marsupialis*, Gm., Plancus, Conch., Min. Not., IV, 5;—*Carybdea periphylla*, Péron.

XC, 3, 4. Body spherical and with eight ribs; two ciliated tentacula susceptible of great elongation issuing from its inferior extremity(1). It is very common in northern seas, and even in the British channel; the Whale is said to feed on it(2).

Naturalists have referred to the same genus, simple species—Idya, Oken—which are merely in the form of a sac furnished with ciliated ribs and open at both ends(3).

Some—Doliolum, Otto—are even destitute of ribs, their form resembling that of a barrel without a bottom(4).

The Callianiræ, Pér. only seem to differ from Beroe by having much more projecting ribs united in pairs forming two species of wings. Their internal organization is not yet well known(5).

The Taniræ, Oken, appear to approximate to Callianira, but they are figured, on each side, with three long ciliated ribs, and two long ramous filaments(6).

The Alcinoes, Rang., have a cylindrical body, open at one extremity and furnished at the other with two large wings, which, when folded over, completely envelope it. Its cylindrical portion is flanked with four projecting ribs terminating in a point and marked by five lines of cilia(1).

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(1) According to Messrs Audouin and Milne Edwards, there exists, in the axis of these animals, a cavity extending from one pole to the other, and communicating externally by means of an inferior opening, which may be considered as an anterior mouth. In the superior third of this cavity is contained, and, as it were, suspended, a sort of straight and cylindrical intestinal tube, whose exterior orifice is exactly at the superior pole, bearing two granular strings—the ovaries?—on each side. The cavity is filled with a liquid in motion, which may be seen passing into two lateral tubes, that are soon divided into four branches, and reach the surface of the body, by opening into longitudinal canals which conduct the fluid into the cilia that are constantly in motion, and appear to be organs of respiration. Finally, from the lateral parts of each of these eight costal canals, arise an infinity of little transverse vessels or sinuses, which establish a communication between them, and dip into the surrounding parenchyma.

On each side of the spheroid, and internally, are two small masses, each of which occupies the bottom of a cavity or cul-de-sac, and gives rise to a long contractile filament; these two filaments issue through two circular openings, situated near the inferior third of the body. They are afterwards divided into numerous branches.

(2) Add *Beroe novem-costatus*, Brug.; Bast., loc. cit., f. 5, and Encyc., XC, 2. The *Beroë ovum*, Fab., Groenl., 362, does not seem to differ from the *pileus*.

(3) The *Beroë ovatus*, Brug., or *Medusa infundibulum*, Gm.; Brown, Jam., XLIII, 2, and Encyc., XC, 1;—*Beroe macrostomus*, Pér., Voy., pl. xxxi, f. 1;—*Beroe ovata, capensis, punctata* and *constricta*, Chamiss. and Eisenh., Ac. Nat. Cur., X, p. i, pl. xxx and xxxi.

N.B. The animal of Martens, Spitzb., pl. P, f. h, which is considered as identical with that of Brown, should rather be approximated to the first subgenus.

(4) *Doliolum mediterraneum*, Otto, Ac. Nat. Cur., XI, p. II, pl. xlii, f. 4.

(5) *Callianira didiploptera*, Pér.; Ann. du Mus., XV, pl. ii, f. 16.

(6) *Beroë hexagone*, Brug.; Encyc. Vers, pl. 90, f. 6.

The Ocyroes, Rang., have a similar body with four ranges of cilia, but without ribs, and similar wings each furnished at base with two ciliated points(2).

It is also near the Beroes that we must place the

Cestum, Lesueur,

A very long gelatinous riband, one of whose margins is furnished with a double row of cilia; they are also apparent on the inferior edge, but are smaller and less numerous. It is in the middle of the inferior margin that we find the mouth, a wide aperture opening into a stomach placed transversely in the thickness of the riband, and terminating by a very small anus. From the anal extremity arise vessels which traverse both extremities of the riband. Two sacs, probably ovaries, open on the sides of the mouth. This animal may be compared to a Callianira with two ribs, and excessively elongated wings. The only species known is the

C. veneris, Lesueur, Nouv. Bullet. des Sc., June 1813, pl. v, f. 1. Its length, or rather width, exceeds five feet, and it is two inches in height. It inhabits the Mediterranean, and is very difficult to preserve entire(3).

The two following genera, which were formerly joined with the Medusæ might also constitute a small family in this order, on account of the internal cartilage which supports the gelatinous substance of the body.

Porpita, Lam.

Where this cartilage is circular and its surface marked with concentric striæ crossed by radiating striæ. The superior surface is merely invested with a thin membrane that projects beyond it; the inferior is covered with a great number of tentacula, the exterior of which are the longest, and furnished with little cilia each terminated by a globule. They sometimes contain air; those in the middle are the shortest, simplest and most fleshy. In the centre of all these tentacula is the mouth, in the form of a little salient proboscis. It leads to a simple stomach surrounded by a sort of glandular substance.

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(1) *Alcinoë vermiculata*, Rang., Mem. de la Soc. d'Hist. Nat. de Par., IV, xix, 1, 2.

(2) *Ocyroë maculata*, Id. Ib., xx, 1, 2;—*Oc. fusca*, Ib. 3;—*Oc. crystallina*, Ib., 4.
The *Callianira heteroptera*, Chamiss. and Eisenh., Ac. Nat. Cur., X, p. II, pl. xxxi, f. 3, will probably form another subgenus.

(3) The *Lemnisque*, Quoy and Gaym., Zool. de Freycin., pl. 86, f. 1, is perhaps a fragment of a Cestum.

One species is known of a beautiful blue colour, that inhabits the Mediterranean and seas of hot climates(1).

VELELLA, Lam.

Where, as in Porpita, there is a mouth in the inferior surface *in* the form of a proboscis, surrounded with innumerable tentacula, the exterior of which is the longest, but the latter are not ciliated, and a still more important character is, that the cartilage, which is oval, has on its superior surface a vertical and tolerably elevated crest. This cartilage is diaphanous, and is merely marked with concentric striæ.

A species of this genus also is known, of the same colour as the Porpita and inhabiting the same seas. It is eaten fried(2).

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(1) It is the *Med. umbella*, Müll., Natur. of Berl., Besch., II, ix, 2, 3; *Holothuria nuda*, Gm.; Forsk., XXVI, l, i; and Encyc., XC, 6, 7; *Porpita gigantea*, Pér., Voy., XXXI, 6.

The *Medusa porpita*, L., is merely its cartilage divested of the gelatine and tentacula.

The *Porpite appendiculée*, Bosc., Vers, II, xviii, 5, 6, if not an altered individual of the same, should constitute a separate subgenus. It is the genus POLYBRACHIONIA, Guilding., Zool. Journ., XI.

(2) It is the *Medusa velella* and the *Holothuria spirans*, Gm.; Forsk., XXVI, k; Encyc., XC, 1, 2. The *Velella scaphidia*, Pér. Voy., XXX, 6, is nowise generically different; it appears that there are several species, such as the *V. oblonga*, *V. sinistra*, *V. lata*, Chamiss. and Eisenh., Ac. Cur. Nat., X, p. I, pl. xxxii.

ORDER II.

HYDROSTATICA.

The Hydrostatic Acalepha are known by one or more bladders usually filled with air, by means of which they suspend themselves in their liquid element. Excessively numerous and variously shaped appendages, some of which probably serve as suckers, and the others perhaps as ovaries, and some longer than the rest as tentacula, are attached to these vesicles and compose the whole apparent organization of these animals. They have no apparent mouth or one which can be decidedly considered as such.

PHYSALIA, Lam.

The Physaliæ resemble an extremely large oblong bladder elevated superiorly into an oblique and wrinkled crest, and furnished beneath, near one of its extremities, with numerous, cylindrical, fleshy productions, variously terminated, that communicate with the bladder. Those in the middle give origin to more or less numerous groups of little filaments; the lateral ones are merely divided into two threads, one of which is frequently very long. There appears to be an extremely small orifice in one of the extremities of the bladder, but internally no other intestine is found, but another bladder with thinner parietes, and cæca that partly extend into the cavities of the crest. There is no nervous, circulating, nor glandular system(1). The animal swims on the surface of the sea when it is calm, employing its crest as a sail. When living, it is also furnished with extremely long filaments, more slender than the others, which are sprinkled, as it were, with pearls or drops. Its touch is said to sting and burn like that of the Sea-nettle.

They are found in all the seas of hot climates(2).

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(1) I have satisfied myself of this total absence of internal and complicated organs in many large individuals, so that I cannot admit the recent idea that the Physalia may be one of the Mollusca.

(2) *Holothuria physalis*, L.; Amœn., Ac., IV, iii, 6; Sloane, Jam., I, iv, 5;—*Me-*

Physsophora, Forsk.

These Acalepha are evidently allied to the Physaliæ, but their bladder is proportionally much smaller, has no crest, and is frequently accompanied by lateral bladders; their various and numerous tentacula are suspended vertically under the bladder, like a garland or cluster. In

Physsophora, Pér.

Or Physsophora properly so called, between the superior bladder and the tentacula are other bladders placed side by side, or one on another, sometimes of an irregular figure, and sometimes polyedrous, forming, by their union, prisms or cylinders. The tentacula partly conical, partly cylindrical, and partly formed by groups of threads or globules, and finally, partly filiform and susceptible of considerable elongation, form a cluster or garland at the inferior extremity(1).

Hippopus, Quoy and Gaym.

Where there are merely lateral vesicles, almost semi-circular, or shaped like the foot of a horse, and crowded into two ranges, thus forming a sort of spike comparable to that of certain grasses, from

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dusa utriculus, Gm., Lamartinière, Journ. de Phys., Nov. 1787, II, 13, 14;—*Medusa caravella*, Müll., Nat. of Berl., Besch., II, 9, 2, are Physaliæ, but which do not appear to be sufficiently described to enable us to unite or distinguish them specifically, I will say the same of the *Physal. pelagica*, Bosc., Vers, II, xix, 1, 2, and the *Physalie mégaliste*, Pèr., Voy. I, xxix, 1. This observation will even apply to those of Tilesius, Voy. of Krusentst. and Lesson, Voy. de Duperr. Zooph., pl. 4 and 5, although better characterized, until we have more accurate observations of the changes which age or other circumstances may produce in the number of the tentacula.

(1) Such is the *Physsophora hydrostatica*, Gm. The individual named *Phys. musonema*, by Pér., Voy. XXIX, 4, is well preserved, that of Forskahl, Ic., XXXIII, E, e, 1, e, 2; Encyc., LXXXIX, 7, 9, appears to be the same species, but deprived of a portion of its tentacula, which are easily removed. I also think that the *Physsophora rosacea*, Forsk., XLIII, B, b, 2, and Encyc., LXXXIX, 10, 11, is a mutilated specimen of another species.

Add *Rhizophysa Chamissonis*, Eisenh., Medus., Ac. Nat. Cur., X, pl. 35, f. 3;—*Rhiz. helianthus*, and *Rhiz. melo*, Quoy and Gaym., Ann. des Sc. Nat., X, pl. 5, and many other undescribed species.

which also depends a kind of garland that crosses all the preceding parts. The united contraction of these vesicles enable the animal to move rapidly(1). In

Cupulita,

The vesicles are regularly attached to the two sides of a frequently very long axis(2).

Racemida, Cuv.

Where all the vesicles are globular and small; each one is furnished with a little membrane, and they are united in an oval mass which moves by their joint contractions(3).

Rhizophyza, Pér.

Where there are no lateral vesicles but merely a superior bladder and an elongated stem, along which the tentacula are suspended, some conical and the others filiform(4). The

Stephanomia, Pér.

Appears to be a third combination, where the lateral bladders, which, in Physsophora proper, adhere to the top of the stem above the tentacula, extend along its length and intermingle with tentacula of various forms(5).

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(1) Quoy and Gaym., An. des Sc. Nat., X, pl. 10, 4, A, f. 1—12.

N.B. The *Glebe* of Otto, Ac. Nat. Cur., XI, p. II, pl. 42, f. 3, is merely a vesicle of a Hippopus.

(2) Voy. de Freycin., Zool., pl. 87, f. 15.

(3) A new genus from the Mediterranean.

(4) *Physsophora filiformis*, Forsk., XXXIII, F; Encyc., LXXXIX, 12; the same as the *Rhizophyza planestoma*, Pér., Voy., XXIX, 3. MM. Quoy and Gaymard, however, think that these Rhizophyzæ are merely Physsophoræ which have lost their lateral bladders.

(5) *Stephanomia Amphitritis*, Péron, Voy., XXIX, 5. The *Stephanomia uvaria*, Lesueur, appears to me to approximate nearer to Physsophora proper.

It is directly after these hydrostatic Acalepha that we may place the

DIPHYES, CUV.

A very singular genus, where two different individuals are always found together, one encased in a cavity of the other, but susceptible of being separated without destroying the life of either. They are gelatinous, diaphanous, and move nearly in the manner of a Medusa. The *receiver* produces from the bottom of its cavity a chaplet which traverses a semi-canal in the *received*, and appears to be composed of ovaries, tentacula, and suckers, like those of the preceding genera.

This genus has been divided by Messrs Quoy and Gaymard according to the relative form and proportions of the two individuals. Thus in

DIPHYES, proper,

The two individuals are almost similar and pyramidal, with some points round their aperture which is at the base of the pyramid(1).

In CALPES the received is still pyramidal, but the receiver is very small and square.

In ABYLES the received is oblong or oval, and the receiver somewhat small and bell-shaped.

In CUBOIDES the received is small and bell-shaped, the receiver much larger and square.

In NAVICULA the received is bell-shaped; the receiver is large but has the figure of a wooden shoe(2).

There are several other combinations.

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(1) Bory Saint-Vincent, Voy. aux Isles d'Afrique.

(2) See the Mem. of MM. Quoy and Gaym., Ann. des Sc. Nat., X.

CLASS IV.

POLYPI(1).

Our fourth class of the Radiata or Zoophytes has been thus named because the tentacula which surround their mouth give them a slight resemblance to an Octopus called *Polypus* by the ancients. The number and form of these tentacula vary. The body is always cylindrical or conical, frequently without any other viscus than its cavity, and frequently also with a visible stomach to which adhere intestines or rather vessels excavated in the substance of the body like those of the Medusæ; in this latter case we usually find ovaries also. Most of these animals are capable of forming compound beings, by shooting out new individuals, like buds. They also, however, propagate by ova.

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(1) This class of animals, although nearly at the end of the series, is one of the largest, and certainly the most singular of the whole. Such is the enormous accumulation of the stony envelopes formed by them in certain seas, that islands are produced, coasts extended, and harbours blocked up by them. The late lamented M. de Lamarck has even hazarded the idea, that the calcareous strata of the globe may have been produced by them. Polypi were formerly considered as stony plants. Imperati (1699) was the first who doubted their vegetable nature, and Trembley's observations on the Hydra (1740) put the question at rest. Since that period, our knowledge of them has been considerably increased by the labours of Ellis, Boccone, Cavolini, Lamouroux, &c. &c. *Am. Ed.*

ORDER I.

CARNOSI.

The first order comprises fleshy animals that usually fix themselves by their base, several of which, however, have the power of crawling on that base, or even of detaching it altogether, and swimming or suffering themselves to be carried away by the current. Most commonly however they merely expand the oral aperture, which is also the anus. It is surrounded with a greater or less number of tentacula, and opens into a stomach en cul-de-sac. Between this internal sac and the external skin we find a tolerably complex, but still obscure organization, chiefly consisting of fibrous and vertical leaflets, to which the ovaries, that resemble tangled threads, are attached. The intervals of these leaflets communicate with the interior of the tentacula, and it appears that water penetrates into and issues from them by small orifices in the circumference of the mouth; the Actiniæ, at least, sometimes ejaculate it in this manner(1).

ACTINIA, Lin.

The fleshy body of these Polypi is frequently ornamented with bright colours, and exhibits numerous tentacula placed round the mouth in several ranges, like the petals of a double flower, and hence their common name of *Sea-Anemones*. They are extremely sensible to the influence of light, and expand or close in proportion to the fineness of the day. When they retract their tentacula, the opening through which those organs pass contracts and closes over them like the mouth of a purse.

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(1) See Spix, Ann. du Mus., XIII, xxxiii, f. 1—5.

Their power of reproduction is scarcely inferior to that of the Hydræ; parts that have been amputated shoot out again, and the animal may be multiplied by division. Their usual mode of generation is viviparous. The little Actiniæ pass from the ovary into the stomach and issue from the mouth. These Zoophytes, when hungry, dilate their mouth to a great extent. They devour all sorts of animals, especially Crustacea, Shell-fish, and small Fishes which they capture with their tentacula and soon digest(1).

ACTINIA, proper.

The true Actiniæ fix themselves by a broad and flat base.

The species most common on the coast of France are

A. senilis, L.(2) Three inches wide, with a coriaceous, uneven, orange-coloured envelope, and two ranges of moderately long tentacula, marked with a rosy ring. It is generally found on the sand into which it soon sinks if disturbed.

A. equina, L.(3) The skin soft and finely striated, usually of a fine purple colour frequently spotted with green; it is smaller than the senilis, with longer and more numerous tentacula. This species covers all the rocks on the French coast of the British channel, ornamenting them as if with the most splendid flowers.

A. plumosa, Cuv.(4) White, and more than four inches wide; the edges of its mouth are expanded into lobes all loaded with innumerable little tentacula; there is an inner range of larger ones.

A. effæta; Rond., lib., XVII, cap. xviii; Bast. xiv, 2(5). A

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(1) See Diquemare, Journ. de Phys., 1776, June, p. 515, and the Memoir on the *Polypi* and *Actiniæ*, by M. Rapp; Weimar, 1829, 4to.,

(2) It is the *Actinia senilis*, Gm., Diquemare, Phil. Trans., LXIII, pl. xvi, f. 10, and pl. xvii, f. 11; the *Actinia crassicornis*, Baster, XIII, 1; the *Act. digitata*, Zool. Dan., CXXXIII; and the *Act. holsatica*, Ib., CXXXIX.

(3) It is the *Actinia equina*, L., Diquem., Philos. Trans., LXIII, xvi, 1, 2, 3, and the *Hydra mesembrianthemum*, Gm., Gært., Phil., Trans. LII, 1—5.

(4) We have no good figure of this species, but I think that of Baster, XIII, 2, must represent it. The *Hydra dianthus*, Gm., Ellis, Phil. Trans., LVII, xix, 8, and Encyc., LXXI, 5, is also closely allied to it, and perhaps even the *Hydra anemone*, Phil. Trans., Ib., 4, 5, Encyc., Ib., 5, 6.

(5) I also believe it to be the *Act. felina*, Diquem., Phil. Trans., LXIII, xvi, 13, referred by Gmelin to his *Actinia truncata*.

It is necessary to remark, that the variation in the form and colours of the Actiniæ renders them extremely difficult to determine, and that we are not to trust to light-brown longitudinally streaked with whitish; its form is usually elongated and frequently narrowest below; skin smooth; tentacula numerous. When it contracts, long filaments arising from the ovaries are frequently protruded through the mouth. It usually fixes itself on shells, and is extremely common in the Mediterranean(1).

The Thalassiantha, Ruppel, are Actiniæ with ramified tentacula(2).

The Discosoma, Rupp., are Actiniæ in which the tentacula are almost reduced to nothing by their shortness(3).

Zoanthus, Cuv.

The same fleshy tissue and arrangement of the mouth and tentacula as in the Actiniæ, and a nearly similar organization; but these animals are united in more or less considerable number on a common base, sometimes in the form of a creeping stem(4), and sometimes having a broad surface(5).

Lucernaria, Mull.

The Lucernariæ should apparently be approximated to the Actiniæ, but their substance is softer; they fix themselves to fuci and other marine bodies by a slender pedicle, and their superior portion dilates like a parasol, in the centre of which is the mouth. Nu-

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the characters established by observers, and still less to the approximations proposed by compilers.

(1) Add of nearly certain species, *Hydra cereus*, Gm.; Gært., Phil. Trans. LII, i, 1; Encyc., LXXIII, 1, 2;—*Hydra bellis*, Phil. Trans. Ib., 2; Encyc. Ib. 4;—*Hydra helianthus*, Ellis, Phil. Trans., LVII, xix, 6, 7; Encyc., LXXI, 1, 2;—*Hydra aster*, Ellis., Phil. Trans., LVII, xix, 3; Encyc. LXXI, 3;—*Actinia varians*, Zool. Dan., CXXIX;—*Act. candida*, Ib., CXV;—*Act. plumosa*, Ib., LXXXVIII;—*Act. coccinea*, Ib., LXIII, 1, 3;—*Act. viridis*, Forsk., XXVII, B; *Act. rubra*, Brug.; Forsk., Ib., A;—*Act. maculata*, Brug.; Forsk., Ib., C;—*Actinia quadricolor*, Ruppel, Voy., Moll., pl. i, f. 3, &c.

(2) *Thal. aster*, Ruppel, Moll., pl. i, f. 2.

(3) *Disc. nummiforme*, Id. Ib., f. 1.

(4) *Hydra sociata*, Gm.; Ell. and Sol., Corall., I, i; Encyc., LXX, 1.

(5) *Alcyonium mammillosum*, Ell. and Sol., loc. cit., 4;—*Alc. digitatum*, Id. Ib., 6. These last form the genus Palythoe of Lamouroux, and lead to the Alcyoniæ. This genus appears to have been characterized from desiccated specimens. See the great work on Egypt, Zool., Polyp., pl. ii, f. 1—4.

merous tentacula united in bundles are arranged round its edges. Between the mouth and these same edges are eight organs resembling cæca, proceeding from the stomach and containing a red and granulated substance. In the

S. quadricornis, Müll., Zool. Dan., XXXIX, 1, 6, the edge is divided into four forked branches, each of which bears two groups of tentacula. In the

L. auricula, Ibid., CLII, the eight groups are equally distributed round an octagonal margin(1).

ORDER II.

GELATINOSI.

The gelatinous Polypi, unlike the preceding ones, are not invested with a firm envelope, neither is there a ligneous, fleshy, nor corneous axis in the interior of their mass. Their body is gelatinous and more or less conical; its cavity supplies the want of a stomach.

HYDRA, Lin.

Of all the animals of this class, these are reduced to the greatest degree of simplicity. A little gelatinous horn, whose edges are provided with filaments that act as tentacula, constitutes their whole apparent organization. The microscope discovers nothing in their substance but a diaphanous parenchyma filled with more opaque granules. Notwithstanding this, they swim, crawl, and even walk by alternately fixing their two extremities in the manner of Leeches or of the caterpillars called Geometræ. They agitate their tentacula and use them for seizing their prey, which can be seen being digested in the cavity of their body. They are sensible to the action of light and seek it, but their most wonderful property is that of being constantly reproduced by the indefinite excision of their parts, so that we can multiply them at will by means of division. Their natural increase is by shoots which push out from various points of the body of the adult, and at first resemble branches.

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(1) Add *Lucer. fascicularis*, Fleming., Werner. Soc., II, xviii, 1, 2;—*Luc. campanula*, Lamouroux, Mém. du Mus., II, xvi. The *Lucernaria phrygia*, Fab.; Faun. Groenl., 345, should, apparently, form another genus. See the Memoir of M. Lamouroux on these Zoophytes, in the Mém. du Mus., II.

Five or six species, all differing in colour and the number and proportion of the tentacula, are found in stagnant waters in France. One of them,

H. viridis, Tremb., Pol., I, 1; Rœs., III, lxxxviii; Encyc., LXVI, is of a beautiful light-green. It is particularly common under the leaves of the Lemnæ, and has been rendered celebrated as the first species on which the experiments relative to the reproductive power of the genus were essayed. The

H. fusca, Tremb., Pol., I, 3, 4; Rœs., III, lxxxiv; Encyc., LXIX, is more rare, and of a grey colour. Its body is not above an inch long, and its arms are more than ten(1).

CORINE, Gært.

The Corines have a fixed stem terminated by an oval body, of a firmer consistence than that of the Hydræ, open at the summit, and completely covered with little tentacula. Some of them carry their ova at the inferior part of the body(2).

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(1) Add *Hyd. grisea*, Trembl., 1, 2; Rœs., III, lxxviii—lxxxiii; Encyc., LXVII; —*Hyd. pallens*, Rœs.; III, lxxvi, lxxvii; Encyc., LXVIII;—*Hyd. gelatinosa*, Zool. Dan., CXV, 1, 2.

N.B. The ten first Hydræ of Gmelin are Actiniæ, and the eleventh—*H. dolio-lum*—a Holothuria.

(2) *Tubularia coryna*, Gm.; or *Coryne pusilla*, Gært., App. Pall. Spicil., X, iv, 8; Encyc., LXIX, 15, 16;—*Tubularia affinis*, Gm.; Pall., Ib., 9; Encyc., Ib., 14;—*Hydra multicornis*, Forsk., XXVI, B. b; Encyc., Ib., 12, 13;—*Hyd. squamata*, Müll., Zool. Dan., IV; Encyc., Ib., 10, 11;—and the species sketched by Bosc., Hist. des Vers, II, pl. xxii, f. 3, 6, 7, 8.

N.B. The genus Corine, which I have not observed myself, appears to merit re-examination.

CRISTATELLA, CUV.

Where there is a double range of numerous tentacula on the mouth, curved into a half moon, forming a plume of that figure, which attracts the nutritious molecules by their regular motion. These mouths are placed on short necks attached to a common gelatinous body which progresses in the manner of a Hydra. These animals are found in stagnant waters in France. To the naked eye they seem to be small spots of mould(1).

VORTICELLA.

Where the stem is fixed, frequently ramous and much divided, each branch terminating by a body shaped like a bell or horn. From the aperture project two opposing groups of filaments which are constantly in motion, and that attract nutritious molecules. The species are very numerous in fresh water, and are generally too small to be perceived without a microscope. They form bushes, arbuscles, plumes, &c. &c.(2)

PEDICELLARIA.

The Pedicellariæ are found between the spines of the Echini, and are considered by various authors as organs of these animals; most probably however they are Polypi, which there seek an asylum. They consist of a long slender stem, which terminates by a horn, furnished at its extremity with tentacula, sometimes filiform and sometimes foliaceous(3).

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(1) *Cristatella mucedo*, Cuv.; Rœs., III, xci.

(2) The only species I refer to this genus are those figured in the Encyc., pl. XXIV and XXVI. They are closely united by strong affinities with certain species placed among the microscopical animals.

(3) Müll., Zool. Dan., XVI, copied Encyc., LXVI.

ORDER III.

CORALLIFERI(1).

The Coralliferi constitute that numerous suite of species which were long considered as marine plants, and of which the individuals are in fact united in great numbers to constitute compound animals, mostly fixed like plants, either forming a stem or simple expansions, by means of a solid internal substance. The individual animals, more or less analogous to the Actiniæ or Hydræ, are all connected by a common body, and are nourished in common, so that what is eaten by one goes to the nutrition of the general body, and of all the other Polypi. Their volition is even in common, at least it is certainly so in the free species, such as the Pennatulæ, which are seen swimming by the contractions of their stems, and the combined motions of their Polypi.

The name of *Polypiers* has been given to the common parts of these compound animals; they are always formed by deposition, and in layers like the ivory of teeth, but are sometimes on the surface, and sometimes in the interior of the compound animal. This difference of position has given rise to the following families.

FAMILY I.

TUBULARII.

Those of the first inhabit tubes of which the common gelatinous body traverses the axis, like the medulla of a tree, and that are open, either on the summit or sides, to allow the passage of the Polypi.

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(1) The Polypes a Polypiers of our author. Here is another instance of the many difficulties I have had to encounter in the course of this work, and of the impro-

Their more simple Polypi appear to be chiefly analogous to the Hydræ and Cristatellæ(1).

TUBIPORA, Lin.

Simple tubes of a stony substance, each containing a Polypus. These tubes are parallel, and united from space to space by transverse laminæ, which has caused them to be compared to the pipes of an organ. The most common species.

T. musica, L.; Seb., III, cx, 89, is of a beautiful red; its polypi are green, and formed like Hydræ. Very abundant in the archipelago of India(2).

It appears that we must approximate to the Tubipora certain fossil Coralliferi (*Polypiers*) also composed of simple tubes, such as the CATENIPORA, Lam., where the tubes are deposited in lines that intercept vacant meshes(3); the FAVOSITES, id.(4), composed of crowded hexagonal tubes, &c.

TUBULARIA, Linn.

Simple or branched tubes of a horny substance, from the extremities of which issue the Polypi.

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priety of the attempts to establish the use of French terms in the Sciences, now being made, notwithstanding the inconvenience, confusion and error they are sure to produce.

The term *polypier*, for which we have no adequate word, has lately been coined to express the common part of these compound animals, or the substance we usually denominate Coral,—*Corallium*—and as it is an excretion, I have ventured to render *Polypes à Polypiers* by *Polypi coralliferi*, and the term *polypiers* by the word *coral*. *Am. Ed.*

(1) This order is the POLYPES A TUYAUX of our author. *Am. Ed.*

(2) The other Tubiporæ of Gmelin do not belong to this genus; some of them, those of Fab., Groenl., in particular, are perhaps tubes of Annelides, but the supposition that the above animal belongs to this last mentioned class is erroneous. It is a true Polypus. See Quoy and Gaym., Zool., de Freycin., pl. 88.

(3) *Tubipora catenulata*, Gm., Linn., Amœn., Ac., I, iv, 20.

(4) *Corallium gothlandicum*, Amœn., Ac., I, iv, 27;—*Fav. commune*, Lamouroux, Ac., Sol., and Ell., pl. 75, f. 1, 2.

The Polypi of the fresh water Tubulariæ—Plumatella, Bosc. (1) —seem to be closely approximated to the Cristatellæ by the disposition of their Tentacula.

Certain species are found in France, that creep over the plants of stagnant waters(2).

Tubularia Marina.

The Polypi of those that inhabit salt water have two ranges of tentacula, the outer one forming radii, and the inner turning up into a tuft. One species,

T. indivisa, Lam.; Ellis, Corall., XVI, c, is found on the coast of France; its tubes are simple and two or three inches high, resembling pieces of straw(3).

Tibiana, Lamour,

Zigzag tubes presenting a small open branch at each angle(4).

Cornularia, Lam.

Where the tubes are conical, from each of which issues a Polypus with eight dentated arms, like those of the Alcyoniæ, Gorgoniæ, &c.(5) In

Anguinaria, Lam.

The tubes are small, cylindrical and adhere to a creeping stem, each one opening laterally, and near the extremity for the passage of a Polypus(1). In

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(1) Lamouroux has changed this name to Naisa.

(2) *Tubularia campanulata*, Rœs., II, lxxiii—lxxv;—*Tub. sultana*, Blumenb., Man., Fr. Trans., II, pl. of p. 10, f. 9;—*Tub. lucifuga*, Vaucher, Bullet. des Sc., Trim., An. 12, pl. xix, f. 6, 7.

(3) Add *Tub. ramosa*, Ellis, Corall., XVII, a;—*Tub. muscoïdes*, Id., XVI, b;—*Tub. trichoïdes*, Id., Ib., a;—*Tub. solitaria*, Rapp., Ac. Nat. Cur. XIV, xxxviii, 2.

(4) *Tibiana fasciculata*, Lamour., Polyp. Flex., pl. vii, f. 3, a.

Here, Lamouroux places Liagores, Telestio and Neomeris, subgenera which perhaps would be as well arranged in the vicinity of the hollow Corallinæ.

(5) *Tubularia cornucopia*. N.B. The pretended Tubulariæ of Esper, pl. xi—xxvi, merely represent the envelopes of ova of some Mollusca Gasteropoda, the eighteenth excepted, which is a Galaxaura.

CAMPANULARIA, Lam.

The extremities of the branches through which the Polypi pass are widened and bell-shaped.

Lamouroux separates them into CLYTIA where the stems are scandent(2):

And LAOMEDEA where they are not; the bells also are smaller and the branches shorter(3).

SERTULARIA, Lin.

The Sertulariæ have a corneous stem, sometimes simple, sometimes ramous, on the sides of which are cells, extremely various in form, that are occupied by the Polypi, all connected with a gelatinous stem that traverses the axis, like the medulla of a tree. They propagate by ova or buds, which are developed in cells larger than the rest, and of a different form.

The various directions of their cells have caused them to be subdivided.

AGLAOPHENIA, Lamour.—PLUMULARIA, Lam.

Where the little cells are arranged on one side only of the branches(4).

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(1) *Sertularia anguina*, Ell., Corall., XXII, ii, c, C, D. Lamouroux has changed this name to AETEA.

(2) *Sertularia verticillata*, Ell., Corall., XIII, a;—*Sert. volubilis*, Id., XIV, a;—*Sert. uva*, Id., XV, 6;—*Sert. rugosa*, Id., XV, a, A.

(3) *Sertularia dichotoma*, Gm., Ell., Corall., XII, a, C;—*Sert. spinosa*, Id. Ib, XI, b, d;—*Sert. geniculata*, Ib., 6;—*Sert. muricata*, Sol. and Ell., Cor., VII, 3, 4.

(4) *Sertularia myriophyllum*, Gm., Ell., Corall., VIII, a, A;—*S. pennatula*, Sol., and Ell., VII, 1, 2;—*S. pluma*, Ell., Cor., VII, b, B, 3;—*S. setacea*, Ib., xxviii, 4, D, T;—*Ol. pinnata*, Ib., XI, a, A; *S. frutescens*, Soll. and Ell. VI, a, A; *S. falcata*, Ell., Corall., VII, a, A; and xxxviii, 5, f;—*Aglaoph. cyprès*, Zool. de Freycin., pl. xci, 1—3;—*Agl. Godard*, Ib., xcv, 9, 10.

Amatia, Lamour.—Serrialaria, Lam.

Where they are united, in certain places, like the pipes of an organ(1).

We might distinguish those species in which the cells, thus disposed, form a spiral line round the stem.

Antennularia, Lam.—Callianyra, Lamour,

Where the cells form horizontal rings round the stem(2).

Thus the name of

Sertularia proper

Becomes restricted to those in which the cells are placed on both sides of the stem, either oppositely(3), or alternately(4). The first are even again separated by Lamouroux under the name of Dynamenes.

Where the cells are extremely small we have his genus Thoea(5).

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(1) *Sertularia lendigera*, Ell., Cor., XV, b, B.

(2) Lamouroux has since changed this name to Nemertesia;—*Sertularia antennina*, Gm., Ell., Cor., IX, a, A, B, C;—*Nemert. ramosa*, Lamour., Ell., Ib., b.

(3) *Sertularia abietina*, Gm., Ell., Corall., I, b, B;—*S. tamarindus*, Ib., a, A;—*S. filicula*, Sol. and Ell., c. C;—*S. polyzonias*, Ell., Cor., II, a, b, A, B;—*S. cupressina*, Ib., III, a, A; *S. argentea*, Ib., II, c, C;—*S. thuya*, Ib., V, b, B;—*S. cupressoides*, Lepech., Act. Petrop., 1780, IX, 3, 4,—*S. lichenastrum*, Ell., Cor., VI, a, A;—*S. racemosa*, Cavol., Pol. Mar., III, vi, 1; 2;—*S. fuscescens*, Bast., Op. subs., I, 6;—*S. obsoleta*, Lepech., Act. Petrop., 1778, pars II, VII, B;—*S. pinus*, Id., 1780, p. I., IX, 1, 2;—*S. cuscuta*, Ell., Cor., xiv, c, C.

(4) *Sertularia operculata*, Ell., Coral., III, b. B;—*S. pinastrum*, Sol. and Ell., vi, b. B;—*S. rosacea*, Ell., Cor., iv, a, A, B, C;—*S. pumila*, Ib., V, a, A;—*S. disticha*, Bosc, Vers, III, xxix, 2;—*S. pelasgica*, Id., Ib., 3;—*Dinam crisioïde*, Zool. de Freycin., pl. xc, f. 12.

(5) *Sertularia hœlecina*, Gm., Ell., Cor., X, a, A, B, C. For other subgenera established in this family by Lamouroux—Pasythea, Salacia, Cymodocea—see his Hist. des Polyp. flexibles, 8vo, 1816, and his Expos. Méthod., des genres des Polyp. 4to, 1821.

FAMILY II.

CELLULARII(1).

Where each Polypus is adherent in a corneous or calcareous cell with thin parietes and only communicates with the others by an extremely tenuous external tunic or by the minute pores which traverse the parietes of the cells. These Polypi bear a general resemblance to the Hydræ.

CELLULARIA, Lin.

Where these cells are so arranged as to form branching stems in the manner of the Sertulariæ, but without a tube of communication in the axis. Their substance also is more calcareous.

Lamouroux separates from them

CRISIA,

Where the cells, placed in two (usually alternate) ranges, open on the same face(2).

ACAMARCHIS,

Where, with the same arrangement we find a vesicle at each opening(3).

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(1) The POLYPES A CELLULES of the original. Am. Ed.

(2) *Sertularia eburnea*, Gm., Ell., Coral., XXI, a, A;—*S. scruposa*, Id., XX, c, C;—*S. reptans*, Ib., b, B, E, F;—*S. fastigiata*, Ib., XVIII, a, A.

(3) *Sertularia neritina*, Gm., Ell., Corall. XIX, a, A, B, C.

Loricula,

Where each articulation consists of two cells placed back to back, of which the opposite orifices are near the top that is widened(1).

Eucratea,

Where each articulation has but a single cell with an oblique aperture(2). We may approximate to them the

Electra, Lamour,

Where each articulation is composed of several cells, arranged in a ring(3).

We should separate from them

Salicorniaria, Cuv.,(4)

Where the cylindrical joints are hollow internally, with their entire surface occupied by cells, arranged in quincunx: they lead to Flustra, and perhaps to Corallina. In

Flustra, Lin.(5)

We find a great number of cells united like honey-combs, sometimes covering various bodies, and sometimes forming stems or leaves, of which, in certain species, one side only is furnished with cells, and in others, both: their substance is more or less corneous(1).

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(1) *Sertularia loricata*, Ell., Cor., XXI, b, B. Lamouroux calls them Loricariæ, but that name has long been devoted to a Fish of the family of the Siluridæ.

(2) *Certularia chelata*, Gm., Ell., Corall., XXII, b, B; *S. cornuta*, Id., XXI, c, C. Here come the less numerous genera, Lafoea, Alecto, Hippothea, for which see Lamouroux, op. cit. As to his Menippeæ (*Sertularia flabellum*, Gm., Sol. and Ell., IV, c, c, 1, C, C, 1; and *S. crispa*, Ib., I, D, D), I doubt whether they belong to this group.

(3) *Flustra verticillata*, Gm., Sol. and Ell., IV, a, A.

(4) *Cellularia salicornia*, Ellis, Corall., XXIII;—*Cell. cereoïdes*, Ell. and Sol., V, b, B, C, &c.;—*Cell. cirrata*, Sol. and Ell., IV, d, D;—*Cell. flabellum*, Ib. c, C.

(5) N.B. According to the observations of Spallanzani, Messrs Audouin, M. Edwards and de Blainville, certain Flustra are inhabited by animals belonging to the group of the Ascidiæ, but according to those of MM. Quoy and Gaymard, there are some which are very certainly inhabited by true Polypi. It is of consequence to know what species belong to the one and to the other.

CELLEPORA, Fab.

Masses of small calcareous vesicles or cells, crowded one against the other, and each perforated by a little hole(2).

TUBULIPORA, Lam.

Masses of little tubes, of which the aperture is as wide as the bottom, or wider(3).

Bodies exist in the ocean that resemble the Corals (Polypiers) of which we have been speaking, both in substance and their general form, but in which Polypi have not yet been discovered. Their nature is consequently doubtful, and great naturalists, such as Pallas and others, have considered them as plants; others, however, consider them as having very small cells, and as being inhabited by coralliferous Polypi. In this case they belong to the present order. Those, in which the interior is filled with corneous threads, still present some analogy to the Ceratophyta. In the

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(1) *Flustra foliacea*, Gm.; Ell., Corall., XXIX, a, A;—*Fl. truncata*, Id., XXVIII, a, A;—*Fl. bombicina*, Sol. and Ell., IV, b, B;—*Fl. carbasea*, Id., III, 6, 7;—*Fl. pilosa*, Ell., Corall., XXXI, a, A, b;—*Fl. tomentosa*, Müll., Zool. Dan., III, xcv, 1, 2;—*Fl. compressa*, Moll., Esch., C, 9;—*Fl. membranacea*, Zool. Dan., CXVII, 1, 2;—*Fl. papiracea*, Moll., Esch., 8;—*Fl. tubulosa*, Bosc, XXVII, III, xxx, 2;—*Fl. dentata*, Ell., Corall., XXIX, C, D, D;—*Fl. quadrata*, Desmar. and Less., Bullet. Philom., 1814, X, v;—*Fl. depressa*, Moll., f. 21;—*Fl. épineuse;—Fl. à diademe;—Fl. à collier;—Fl. globifere.* The whole four of Zool. de Freycin., pl. 89;—*Fl. à petit vase*, Ib., 91;—*Fl. gentille;—Fl. margaritifera*, Ib., 92;—*Fl. à grande ouverture*, Ib., pl. 93, f. 6, 7;—*Fl. à petits sillons;—Fl. à gibecière;—Fl. à petits nids*, Ib., 95, and the new species figured in the great work on Egypt, Zool. Zooph., p. 7—10. To this genus also are attached the PHERUSÆ of Lamouroux—*Fl. tubulosa*, Esper, IX, 1, 2;—his BERENICES, Lamour., Sol. and Ell., pl. LXXX, f. 1—6;—his ELSRINÆ, Ib., LXIV, 15 and 16, and other subgenera, for which see his work.

(2) *Cellepora hyalina*, Gm., Cavol., Pol, Mar., III, ix, 8, 9;—*C. magneville*, Lamour., Polyp. Flex., pl. i, f. 3;—*C. megastoma*, Desmar., and the Bullet. Philom., 1814, II, 5;—*C. globulosa*, Ib., 7;—*C. annulans*, Moll.; Esc., 4;—*C. pumicosa*, Ell., Coral., XXVII, F, and XXX, d, D;—*C. rubra*, Müll., Zool. Dan., CXLVI, 1, 2;—*C. radiata*, Moll., Esc., 17, A, I;—*C. sedecimdentata*, Id., 16, A, C;—*C. bimucronata*, Id., 18, A, C;—*C. vulgaris*, Id., 10, A, B;—*C. borniana*, Id., 14, A, C;—*C. Otto-Mulleriana*, Id., 15, A, C.

(3) *Millepora tubulosa*, Gm., Ell., Corall., XXVII, c, E.

CORALLINA, Lin.

We observe articulated stems placed on species of roots, and divided into branches, also articulated, on the surface of which no pores can be seen, and in which no Polypi have hitherto been discovered.

They are divided as follows.

CORALLINA, proper,

Where the calcareous joints have a homogeneous appearance, and are without any apparent bark.

C. officinalis, L.; Ell., Corall., XXIV, a, A, b, B. The bottom of the sea on certain coasts is completely covered with this coral, the joints of which are oboval and the ramusculi arranged like pinnate leaves, bearing other branches similarly disposed. It is white, reddish, or greenish. It was formerly employed in pharmacy on account of its calcareous nature(1).

Lamouroux also distinguishes, but for trivial reasons,

AMPHIROEA,

Where the articulations are elongated(2).

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(1) Add *Corallina elongata*, Gm., Ell., Corall., XXIV, 3;—*C. cupressina*, Esper., Zooph., VII, 1, 2;—*C. squammata*, Ell., XXIV, c, C;—*C. granifera*, Sol. and Ell., XXI, c, C;—*C. subulata*, Id., Ib., b;—*C. Turneri*, Lamour., Pol. Flex., X, 2;—*C. crispata*, Id., Ib., 3;—*C. simplex*, Id., Ib., 4;—*C. calvadosii*, Sol. and Ell., XXIII, 14;—*C. palmata*, Id., XXI, a, A;—*C. sagittata*, Zool.; de Freycin., pl. 95, f. 11, and 12.

(2) *Corallina rigens*, Sol. and Ellis, XXI, d;—*C. tribulus*, Id., Ib., c;—*C. cuspidata*, Ib., f;—*Amph. fucoïdes*, Lamour., Polyp. Flex., XI, 2;—*Amph. gailloni*, Id., Ib., 3;—*A. verrucosa*, Id., Ib., 5;—*A. jubata*, Ib., 6.

JANIA,

Where the branches are merely more slender and the articulations less cretaceous(1).

CYMOPOLIA,

Where the articulations are separated from each other(2) by corneous intervals; the pores on their surface are more decidedly marked.

M. de Lamarck had already separated

PENICILLA, Lam.—NESEA, Lamour,

Where the stem is simple and composed internally of corneous fibres woven, and, as it were, felted together; it is encrusted by a calcareous covering, and terminated by a bundle of articulated branches analogous to those of the ordinary Corallinæ(3).

HALYMEDES, Lamour,

Where the stems are articulated and divided as in Corallina; but the substance of their joints, which are very wide, is penetrated internally by corneous threads, from which the calcareous crust is easily detached by acids(4).

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(1) *Corallina rubens*, Ell., Corall., XXIV, f. F;—*Jania micrarthrodia*, Lamour., Pol. Flex., I, 69, f. 5, and Sol. and Ell., pl. 69, f. 7 and 8;—*J. crassa*, Id., pl. 69, f. 9, 10;—*J. compressa*, Zool. de Freycin., pl. 90, f. 8, 9, 10.

(2) *Corallina barbata*, Gm., Ell., Corall., XXV, c, C;—*C. rosarium*, Sol. and Ell., XXI, h, H.

(3) *Corallina penicillus*;—*C. peniculum*;—*C. phœnix*;—*Nesea nedulosa*, Zool. de Freyc., pl. 91, f, 8, 9.

(4) *Corallina tuna*, Soll. and Ell., XX, e;—*C. opuntia*, Id., Ib., b;—*C. incrassata*, Id., Ib., d. It is the second division of the Flabellariæ of Lamarck.

Flabellaria, Lam.

Where there are no distinct articulations; they consist of large foliaceous expansions formed like the joints of the Halymedes and the stem of the Penicillæ, of corneous threads enveloped with a calcareous crust(1).

Galaxaura, Lamour,

Where the stems are dichotomous, but their branches hollow(2).

Liagora, Lamour,

Where the stems are hollow and dichotomous, but are without articulations(3).

It is perhaps directly after the Corallinæ that should come the

Anadiomene, Lamour,

Vulgarly termed *Corsican Moss*, and which is so useful as a vermifuge.

It is composed of articulations, regularly ramous, and consists of a somewhat corneous substance invested with a gelatinous covering(4).

Of all these productions without apparent Polypi, which are conjecturally referred to the Coralliferi, few are more singular than the Acetabula, or

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(1) *Corallina conglutinata*, Sol. and Ell., XXV, 7;—*C. flabellum*, Ib., XXIV, C; and *C. pavonia*, Esper, Corall., VIII, IX—the first division of the Flabellariæ of Lamarck. Lamouroux has changed this name to Udotea.

(2) *Corallina obtusata*, Sol. and Ell., XXII, 2;—*C. lapidescens*, Id., Ib., 9;—*Tubularia fragilis*, L.; Sloane, Jam., XXX, 10;—*Tubul. umbellata*, Esper, Tubul., XVII;—*Corallina marginata*, Sol. and Ell., XXII, 6;—*Corall. fruticulosa*, Ib., 5;—*Galaxaure roide*, Zool. de Freycin., pl. 91, f. 10, 11.

(3) *Corallina marginata*, Sol. and Ell., XXII, 6;—*C. fruticulosa*, Id., Ib., 5.

(4) *Anadiomene flabellata*, Lamour., Poll. Flex., XIV, f, 3, and Sol. and Ell, App., pl. 69, f. 15, 16.

N.B. The Galaxauræ and Liagoræ form the genus Dichotomaria of Lamarck, but are not as that naturalist thought vaginiform Coralliferi, for there are no Polypi in the tube.

Acetabulum, Lam.

Where we find a slender and hollow stem supporting a round thin plate, like a parasol, with radiating striæ, cranulated at the edge and having a little smooth disk surrounded with pores in the centre. No Polypi can be discovered in them. The rays of the disk are hollow and contain greenish granules, a circumstance which led Cavolini to consider them as plants(1).

One of them—*Tubularia acetabulum*, Gm.—Donat., Adri., III; Tournef., Ins. CCCXVIII(2), is found in the Mediterranean.

Polyphysa, Lam.

Where, as in the preceding, we find a hollow and slender stem, but which bears on its summit a bundle of little closed vesicles in place of a disk formed of tubes(3).

FAMILY III.

CORTICATI.

This family comprises genera in which all the Polypi are connected by a common, thick, fleshy or gelatinous substance, in the cavities of which they are received, and which envelopes an axis varying in form and substance. The Polypi of those that have been observed are somewhat more complex than the preceding ones and approximate more closely to the Actiniæ. Internally we observe a stomach from which eight intestines originate, two that are prolonged into the common mass, and two that are shorter, and seem to supply the place of ovaries(1).

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(1) I cannot find the openings round the circumference mentioned by M. de Lamarck. The tubes which form the rays are closed. The pretended tentacula described by Donati were foreign bodies. Neither the *Acetabula* nor *Polyphysa* are vaginiform Polypi.

N.B. Since the first edition of this work, M. Rafeneau, of Lille, has presented a Memoir to the Academy, in which he considers the Acetabulum as a plant, belonging to the family of the Confervæ.

(2) Add the *Acétabule petit godet*, Zool. de Freycin., pl., xc, f. 6, 7.

(3) *Pol. aspergillum*, Lamour.; Sol. and Ell., App., pl. 69, f. 2—6, or *Fucus peniculus*, D. Turner, Fuc., IV, pl. 228.

They are subdivided into four tribes.

In the first, that of the

CERATOPHYTA,

The internal axis has the appearance of wood or horn, and is fixed. Two genera of them are known, and both extremely numerous.

Antipathes, Lin.

Commonly termed *Black Coral*, where the ramous and ligneous-like substance of the axis is enveloped with a bark so soft, that it becomes destroyed after death, when it resembles branches of dry wood(2).

Gorgonia, L.

Where, on the contrary, this horny or ligneous substance of the axis is enveloped by a bark the thickness of which is so penetrated by calcareous granules, that it dries on the axis, retaining its colours, which are frequently extremely vivid and beautiful; it is soluble in acids. The Polypi of several species have been observed; each one is furnished with eight denticulated arms, a stomach, &c. like those of Corallina and Alcyonium(3).

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(1) M. Savigny has published some observations on these animals, not less interesting than those on the compound Ascidia.

(2) *Ant. spiralis*, Sol. and Ell., pl, XIX, f. 1, 6; and the other species indicated by Lamarck, Anim. sans Vert., II, p. 305, et seq.

(3) *Gorgonia pinnata*, Gm.;—*G. americana*;—*G. setosa*;—*G. sanguinolenta*, which Lamouroux considers as varieties of a single species;—*G. petechizans*, Sal. and Ell., XVI;—*G. patula*, Sol. and Ell., XV, f. 3, 4;—*G. palma*, Sol. and Ell., XI;—*G.*

M. Lamouroux separates from them

Plexaures,

Of which the thick bark, with non-salient cells, effervesces but slightly in acids(1).

Eunicea,

Where the bark, organized like that of the Plexaures, is furnished with projecting mammillæ, from which the Polypi protrude(2).

Muricea,

Where the moderately thick bark is provided with projecting mammillæ, covered with imbricated and rough scales(3).

Primnoa,

Where the elongated mammillæ become imbricated by hanging one over the other(4).

In the second tribe, that of the

LITHOPHYTA,

The internal axis is of a strong substance and fixed. In

Isis, Lin.

This axis is ramous, and has no cells or cavities on its surface. The

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verriculata, Id. XVII;—*G. umbraculum*, Id., X;—*G. exserta*, Id., XV, 1, 2;—*G. ceratophyta*, Id., II, 1, 2, 3; IX, 5, 6, 7, 8; XII, 2, 3; *G. viminalis*, Id., XII, 1;—*G. verticillaris*, Id., II, 4, 5;—*G. Briareus*, Id., XIV, 1, 2, &c.

(1) *Gorgonia crassa*, Gm., Ac. des Sc., 1700, pl. ii;—*G. suberosa*, Ell., Corall., XXVI, f. p, q, r;—*G. friabilis*, Lamour., Sol. and Ell., XVIII, f. 3.

(2) *Gorgonia antipathes*, Seb., III, civ, 2, cvii, 4;—*Eun. limiformis*, Lamour., Sol. and Ell., XVIII, f. 1;—*Eun. clavaria*, Id., Ib., 2;—*Eun. mammosa*, Lamour., add. to Sol. and Ell , LXX, f. 3.

(3) *M. spicifera*, Lamour., or *Gorg. muricata*, Gm.; App. to Sol. and Ell., LXXI, f. 1, 2;—*M. elongata*, Lamour., Id. f. 3, 4.

(4) *Gorg. reseda*, Gm.; Sol. and Ell., XIII, f. 1, 2.

animal bark which envelopes it is mixed with calcareous granules, as in the Gorgoniæ. In the

CORALLIUM, Lam.

The axis is without articulations, and is merely striated on its surface.

It is to this subgenus that belongs the

Isis nobilis, L.; Esp., I, VII, or Coral of commerce, so celebrated for the beautiful red colour of its stony axis, and for the high polish of which it is susceptible. It constitutes the object of a lucrative fishery in several parts of the Mediterranean. Its bark is reddish and cretaceous. The Polypi, as in many other genera, have eight denticulated arms.

MELITÆA, Lam.

Where the stony substance of the axis is interrupted by knots filled with a matter resembling cork(1). In

ISIS, Lam.

Or Isis properly so called, it is interrupted by strangulations of which the substance resembles horn. The thick and soft bark falls more easily than that of the preceding ones(2).

M. Lamouroux also distinguishes from Isis proper,

MOPSEA,

Where the bark is thinner and more durable(3).

MADREPORA, Lin.

The stony portion of Madrepores is either ramous, or forms rounded masses, or leaves, but is always furnished with lamellæ which unite concentrically in points where they represent stars, or which terminate in lines more or less serpentine. While alive, this stony portion is covered with a living bark, soft, gelatinous, and completely covered with rosettes of tentacula which are the Polypi or rather the Actiniæ, for they usually have several circles of tentacula, and the lamellæ of the stars correspond in some respects to the membranous laminæ of the body of the Actiniæ. The bark and Polypi contract on the slightest touch.

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(1) *Isis ocracea*, Esper., I, iv;—*Is. coccinea*, Id., III, A, 5.

(2) *Isis hippuris*, L.; Sol. and Ell., Zooph., III; Esper, I, 1;—*Is. elongata*, Esper, I, vi.

(3) *Isis dichotoma*, Seb., III, cvi, 4;—*Is. encrinula*, Lam., or *Is. verticillata*, Lamour., Pol. Flex., XVIII, f. 2, and App. to Sol. and Ell., LXX, f. 4.

The diversity of their general form, and of the figures which result from the combination of their lamellæ, has given rise to various subdivisions, several of which however re-enter others. It will be impossible to establish them definitively until the relation of the Polypi with those forms are known.

When there is but a single star, circular or in an elongated line, with very numerous laminæ, we have the FUNGIA, Lam.(1) The animal exactly represents a single Actinia, with large and numerous tentacula, and of which the mouth corresponds to the depressed part in which all the laminæ terminate.

Stony corals with a single star, that appear to have been perfectly free from adhesion, are found among fossils, and constitute the TURBINOLIA, Lam.(2), CYCLOLITHUS(3), and TURBINOLOPSIS, Lamouroux(4).

When the Madrepore is ramous, and the stars are confined to the extremity of each branch, it becomes the CARYOPHYLLIA, Lam. The branches are striated. At each star is a mouth surrounded with numerous tentacula(5).

OCULINA, Lam.

The Oculinæ have very short lateral ramusculi, giving them the appearance of having stars along the branches as well as at the end(1). In

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(1) *Mad. fungites*, L., or *Fungia agariciformis*, Lam., Sol. and Ell., pl. XXXVIII, f. 5, 6.;—*M. patella*, or *F. patellaris*, Lam., Id., Ib., 1, 2, 3, 4;—*M. pileus* or *Fung. limacina*, Lam., Id., pl. XLV; Seb. III, cxi, 3, 5;—*F. talpa*, Lam.; Seb., cxi, 6, and cxii, 31.

(2) *Mad. turbinata*, L.; Am. Ac., I, iv, 1, 2, 3, 7;—*Turb. crispa*, Lamour, App. to Sol. and Ell., LXXIV, f. 14—17;—*T. cristata*, Ib., f. 18, 21;—*T. compressa*, Ib., 22, 23.

(3) *Mad. porpita*, L., Am. Ac. I, iv, 5; *Cycl. elliptica*, Guett., Mem., III, xxi, 17, 18.

(4) *Turbinolopsis ocracea*, Lamour., App. Sol. and Ell., pl. LXXXII, f. 4—4.

(5) *Madr. cyathus*, Sol. and Ell., XXVIII, f. 7;—*M. calicularis*, Gm., Esper, I, pl. xvi;—*M. fasciculata*, Sol. and Ell., XXX;—*M. flexuosa*, Sol. and Ell., XXXII,

Madrepora, Lam.

Or his Madrepores proper, the whole surface is roughened by little stars with projecting edges(2).

In his Pocillopora we observe little impressed stars with pores in the intervals(3).

In his Serialopora, these little stars are disposed in linear ranges(4).

Astrea, Lam.

A broad surface, usually convex and excavated by crowded stars, each containing a polypus furnished with numerous arms, but on a single range, in the centre of which is the mouth(5).

When it is a plane surface, or forms broad laminæ covered with stars on one side, it becomes an Explanaria(6).

The Porites are a sort of ramous Astreæ(7).

When this surface is marked with elongated lines, like little valleys separated by transversely furrowed hills, we have the Meandrina, Lam.

In each valley, and from space to space, we find mouths, and the

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1;—*M. ramea*, Sol. and Ell., XXXVIII;—*M. fastigiata*, Id., XXXIII;—*M. angulosa*, Id., XXXIV;—*M. carduus*, Id., xxxv, &c.

(1) *Mad. virginea*, L.; Sol. and Ell., XXXVI;—*M. hirtella*, Id., XXXVII;—*M. axillaris*, Id., XII, 5;—*M. prolifera*, Id., XXXII, 2, &c.

(2) The species arranged by Lamarck in this subgenus are regarded by Gmelin, Esper, &c., as varieties of the *Madrepora muricata*, L.; Pol. and Ell., LVII, &c.

(3) *Mad. damicornis*, Esper, XLVI;—*Millepora cærulea*, Sol. and Ell., XII, 4.

(4) *Mad. seriata*, Pall.; Sol. and Ell., XXXI, 1, 2.

(5) *Mad. radiata*, Sol. and Ell., XLVII, 8;—*M. annularis*, Sol. and Ell., LIII, 1, 2;—*M. rotulosa*, Id., LV, 1, 3;—*M. ananas*, Id., XLVII, 6;—*M. pleïades*, Id., LIII, 7, 8;—*M. stellulata*, Id., LIII, 3, 4;—*M. favosa*, Id., L, 1;—*M. denticulata*, Id., XLIX, 1;—*M. abdita*, Id., L, 2;—*M. siderea*, Id., XLIX, 2;—*M. galaxea*, Id., XLVII, 7.

(6) *Mad. cinerascens*, Sol. and Ell., XLIII;—*M. aspera*, Id., XXXIX.

(7) *Mad. porites*, Sol. and Ell., XLVII;—*M. foliosa*, Id., LII, &c.

tentacula, instead of forming rosettes round them, form a range along the sides of the valley. In some species they are totally wanting, the margin of each mouth being merely festooned(1).

If the hills which separate these valleys are raised in leaves or crests, sulcated on both sides, it is a PAVONIA. Mouths, usually without tentacula, are found at the bottom of the valleys(2).

When these hills are conical or like projecting stars; we have the HYDNOPHORA of Fischer, and the MONTICULARIA of Lamarck. They should be distinguished according to the situation of their Polypi, which are at the summit of the projecting parts, as in Oculina, or at the bottom of the cavities, as in Meandrina(3).

AGARICINA.

The Agaricinæ are composed of laminæ hollowed on one side only by the valleys, which are themselves sulcated(4).

It is thought that we may approximate to the Madrepores in general, certain corals (Polypiers) or the SARCINULA, Lam., composed of cylinders, a section of which forms stars, by reason of the projecting laminæ which traverse the interior(5). When there is a solid axis in the middle of these laminæ we have STYLINA. These corals are perhaps as nearly related to the Tubiporæ.

MILLEPORA, Lin.

Where the stony portion is extremely various in form, and the surface merely marked with little holes or pores, or even without any apparent orifices.

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(1) *Mad. labyrinthica*, Sol. and Ell., XLVI, 3, 4;—*M. cerebriformis*, Seb., III, cxii, 1, 5, 6;—*M. dædalea*, Id., XLVI, 1;—*M. meandrites*, Id., XLVIII, 1;—*M. areolata*, Id., XLVIII, 4, 5;—*M. crispa*, Seb., III, cviii, 3—5;—*M. gyrosa*, Sol. and Ell., LI, 2;—*M. phrygia*, Id., XLVIII, 2;—*M. filograna*, Gm.; Guall. Ind., XCVII.

(2) *Mad. agaricites*, Sol. and Ell., 43;—*Mad. lactuca*, Id., XLIV;—*M. cristata*, Id., XXXI, 3, 4, &c.

(3) *Mad. exesa*, Sol. and Ell., XLIX, 3;—and the different Hydnophoræ of Fischer.

(4) *Mad. cucullata*, Sol. and Ell., XLII;—*M. undata*, Id., XL;—*M. complicata*, Id., xli, 1, 2.

(5) *Mad. organum*, L., Ann. Ac., I, iv, 6.

Disticophora, Lam.

Where the more strongly marked pores are arranged on two sides of the branches(1). Of those in which the pores are equally distributed, we distinguish

Millepora, Lam.

Or Milleporæ proper, which are solid, and variously ramous(2).

When their pores are not apparent, as is sometimes the case, they are called Nullipora(3).

Then we have the

Eschara, Lam.

Which are furnished with flattened, foliaceous expansions(4).

Retepora, Lam.

Which are Escharæ, pierced with meshes(5).

Adeona, Lamour.

Escharæ borne on an articulated stem; some are entire, and others pierced with meshes(6).

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(1) *Millepora violacea*, Pall., Sol. and Ell., pl., XXVI, f. 3, 4, copied Encyc. Méthod., Vers, pl. 481, f. 1.

(2) *Millepora alcicornis*, Pall., Esper, I, v, 7 and Supp. I, xxvi;—*Mill. aspera*, Lam., Esper, Supp., I, xviii;—*M. truncata*, Sol. and Ell., XXIII, f. 1—8.

(3) *Millepora informis*, Ell., Corall., XXVII, f. c;—*M. calcarea*, Sol. and Ell., XXIII, f. 13;—*M. cretacea*, Id., Ib., 9;—*M. alga*, Id., Ib., 10, 11, 12.

(4) *Millepora foliacea*, Ell. Corall., XXX, f. a;—*Eschara lichenoïdes*, Seb., III, c. 10;—*Esch. lobata*, Lamour., add to Sol. and Ell., LXXII, f. 9—12.

(5) *Millepora cellulosa*, vulgo, *Manchette de Neptune*, Ell., Corall., XXV, f. d.; Daubent., Pl. Enl., No. 23, No. XXIII;—*M. reticulata*, Marsill., Hist. Mar. pl. XXIV, f. 165, 166.

(6) *Adeona grisea*, Lamouroux, Sol. and Ell., LXX, f. 5;—*Ad. follicolina*., Id.

For these genera as well as several others, established on considerations of but little importance, see the "*Exposition Methodique des genres des Polypiers, avec les planches de Solander et Ellis*," by Lamouroux. Paris, 1821.

In the third tribe, or the

NATANTES,

The axis is stony but not fixed.

PENNATULA, Lin.

A common body, free from all adhesion(1), of a regular and constant form, and susceptible of locomotion by the contractions of its fleshy portion and the combined action of its Polypi. This body is fleshy, and contracts or dilates in its various parts by means of the fibrous layers that enter into its composition; its axis encloses a simple stony stem; the Polypi have generally eight dentated arms.

Most of the species diffuse a vivid phosphorescent light.

Whatever be the general form of the Pennatulæ, one of their extremities is always destitute of Polypi, and has been compared to the tubular portion of a bird's feather.

PENNATULA, Cuv.

The Pennatulæ, properly so called, have given their name to the whole genus, which name has been derived from their own resemblance to a quill. The portion destitute of Polypi is cylindrical and terminates in an obtuse point. The other part is furnished on each side with wings or laminæ, more or less long and broad, supported by spines or rigid setæ which arise from their interior and roughen one of their edges, without, however, being articulated with the stony stem of the axis; it is from between their laminæ that the Polypi protrude.

P. rubra, *P. phosphórea*, Gm.(2); Albinus, Annot. Acad., I, vi, 3, 4. Where the stem between the laminæ is extremely scabrous posteriorly, with the exception of a longitudinal line. In the Atlantic ocean and Mediterranean.

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(1) Certain species penetrate into the sand or become entangled in the folds of various marine bodies, but never form any durable adhesion.

(2) Both are red. The *P. rubra* only differs from the other in having a little spine at the base of each posterior lamina. It is perhaps a mere variety.

P. grisea, Gm.; Albinus, Annot. Acad., I, vi, 1, 2. Larger, with broader and more spinous laminæ; stem smooth. More particularly in the Mediterranean(1).

Virgularia, Lam.

The Virgulariæ only differ from the Pennatulæ in their wings, which, much shorter in proportion to their total length, are destitute of spines(2).

These wings sometimes merely represent transversal ranges of tubercles(3). In

Scirpearia, Cuv.

The body is very long and slender and the Polypi are insulated and ranged alternately along the two sides(4). In

Pavonaria, Cuv.

The body is also elongated and slender, but the Polypi only occupy one side, where they are crowned in quincunx(5). In

Renilla, Lam.

The body is short, and instead of that part which in Pennatula proper is furnished with filaments, has a broad reniform disk bearing the Polypi on one of its faces(6). In the

Veretillum, Cuv.,

We find a cylindrical body, simple and without branches, furnished with Polypi in a portion of its length. The bone is usually small and the Polypi large. We can trace the prolongations of intestines into the common stem in these compound Zoophytes much more easily than in any of the others.

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(1) Add *Pennatula argentea*, Sol. and Ell., Zooph., VIII, 1, 2, 3;—*P. grandis*.

(2) *Pennatula mirabilis*, Müll., Zool. Dan., XI, very different from the true *Pennat. mirabilis* of Linnæus.

(3) *Pennatula juncea*, Pall. and Gm.; also very different from the *P. mirabilis*, L. The *Virgulaire australe*, Lam., does not differ from the *juncea*.

(4) *Pennatula mirabilis*, L.; Mus. Ad. Fred., XIX, 4.

(5) *Pennatula antennina*, Bohatsch, IX, 4, 5;—*Penn. scirpea*, Pall. and Gmelin.

(6) *Pennatula reniformis*, Ell., Phil. Trans., LIII, xix, 6, 13, or *Alcyonium agaricum*, Gm.

One species that inhabits the Mediterranean—*Pennatula cynomorium*, Pall., Miscell. Zool., XIII; *Alcyonium epipetrum*, Gm.; Rap., Ac. Nat. Cur., XIV, p. 2, pl. xxxviii, 1, is frequently more than a foot in length, thicker than the thumb, and remarkable for the phosphoric light that it diffuses(1).

Finally, in the

OMBELLULARIA, CUV.

We remark a very long stem, supported by a bone of similar length, and terminated at the summit only by a bundle of Polypi(2).

Small, porous and stony bodies, which naturalists have thought may be approximated to the Millepora, are found among fossils and in the ocean. If they were enveloped by a rind or bark containing Polypi, they would be movable Coralliferi, and should rather be placed near the Pennatulæ. Such are the

OVULITES, Lam., which have the form of eggs, hollow, and frequently perforated at both ends: the LUNULITES, which are orbicular, convex, striated, and porous on one side, and concave on the other: and the ORBULITES, that are orbicular, flat, or concave, porous on both sides or on the edges. If the DACTYLOPORA be free, as is the opinion of Lamarck, it will also belong to this subdivision; it is a hollow ovoid, open at both ends and with two envelopes, both perforated by meshes like the Retepora(3).

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(1) Add *Pennatula phalloïdes*, Pall., Misc. Zool., XIII, 5—9;—*Pennat. stellifera*, Müll., Zool. Dan., XXXVI, 1—3.

(2) *Pennatula encrinus*, Ell., Corall., XXXVII, a, b, c.

N.B. The *Pennatula filosa* and the *Pennatula sagittata* are parasitical animals of the genus *Lernea* (PENNELLA, Oken), and not Pennatulæ. The *Pennat. sagitta*, Esper, Pennat., pl. v, is very different from that of Linnæus, and is perhaps a Nepthys.

(3) The *Rétéporite*, Bosc., Journ. de Phys., June 1826. For these genera of little free Millepora, see also the work of Lamouroux just quoted.

In the fourth tribe the animal rind or bark encloses a mere fleshy substance without an axis either osseous or horny. In

ALCYONIUM, Lin.

As in the Pennatulæ, we observe Polypi with eight denticulated arms, and intestines prolonged into the common mass of the ovaries: but this mass is not supported by an osseous axis; it is always fixed to the body; and where it is drawn out into trunks and branches, nothing is found internally, but a gelatinous substance traversed by numerous canals surrounded with fibrous membranes. The bark is harder and excavated by cells into which the Polypi withdraw more or less entirely. The

A. digitatum, Ell., Corall., XXXII, which is divided into thick and short branches; and the *A. exos*, where branches are more slender, of a beautiful red, &c., are very abundant in European seas.

Linnæus and his successors have rather lightly united to the Alcyonia various marine bodies of different tissues but always without any visible Polypi. Such are

THETHYA, Lam.

Where we observe the interior roughened with long, siliceous, spiral lines, which unite on a similarly siliceous and central nucleus. The crust, as in Spongia, presents two sorts of holes; the first, closed by a sort of grating, must be for the intromission of water, and the second, which are gaping, for its exit(1).

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(1) See Messrs Audouin and Milne Edwards, Ann. des Sc. Nat., XV, p. 17.

N.B. A great portion of the *Alcyonia* of Lam. belong in reality to his Thethyæ.

Add the fossil genera, which M. Lamouroux thinks he can approximate to the *Alcyonia* or Thethyæ: his HALLIRHOE, and those which form his order of the ACTINIARIA; his CHENONDOPORA, HIPPALINÆ, LIMNOREÆ, SERRÆ, &c.—all productions of which the nature is more or less problematical.

After the Alcyonia are also placed the

SPONGIA, Lin.(1)

Or Sponges; marine, fibrous bodies whose only sensible portion appears to be a sort of tenuous gelatine which dries off, scarcely leaving a trace of it, and in which neither Polypi nor other moving parts have yet been discovered. Living Sponges are said to exhibit a sort of tremulousness or contraction when they are touched; it is also affirmed that the pores, with their superficies, are perforated, and present a sort of palpitation; the existence of these motions, however, is doubted by M. Grant(2).

Sponges assume innumerable shapes, each according to its species, and resemble shrubs, horns, vases, tubes, globes, fans, &c.

Every one knows the

S. officinalis, or common Sponge, which is found in large brown masses, formed of extremely fine, flexible, and elastic fibres, perforated with numerous pores and little irregular canals, all of which intercommunicate.

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(1) The genus of the Sponges is extremely rich in curious species, and would well repay its study. M. de Lamarck—An. sans Vert., II, 345, et seq.—will prove an excellent guide. See also the important Memoir of M. Grant, Ann. des Sc. Nat., XI, pl. xvi.

(2) M. Audouin and M. Edwards, Ann. des Sc. Nat., XI, pl., xvi, have adopted this opinion of M. Grant.

CLASS V.

INFUSORIA.

Naturalists usually close the catalogue of the animal kingdom with beings so extremely minute as to be invisible to the naked eye, and which have only been discovered since the invention of the microscope has unveiled to us, as it were, a new world. Most of them present a gelatinous body of the greatest simplicity, and for these, this is undoubtedly the situation; but authors have placed among the Infusoria, animals apparently much more complicated, and which only resemble them in their minuteness, and the dwelling in which they are usually found.

They will constitute our first order, though we must still insist upon the doubts relative to their organization which are not yet dissipated(1).

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(1) N.B. As the nature of this work does not require me to enter into the endless details concerning these infinitely minute beings, and as I can say nothing concerning them from my own observations, I can only refer the reader to the work of M. Bory de Saint Vincent, entitled "*Essai d'une Classification des Animaux Microscopiques,*" extracted from the second volume of the Zoophytes, of the Encyc. Méthodique, Paris, 1826, where these little animals are divided into eighty-two genera.

ORDER I.

ROTIFERA.

The Rotifera, as above stated, are distinguished by a greater degree of complication. Their body is oval and gelatinous; we can distinguish in it a mouth, a stomach, an intestine, and an anus near the first. It most commonly terminates posteriorly in a tail that is variously constructed, and anteriorly it bears a singular organ, variously lobate, with denticulated edges, and of which the denticulations vibrate successively in such a manner as to give the organ itself the appearance of one or more dentated and revolving wheels. One or two prominences on the neck have even appeared to some observers to be furnished with eyes. This revolving organ does not serve to direct their aliment to the mouth; it may be supposed to have some connection with the function of respiration(1). In

FURCULARIA, Lam.

The body is unarmed; the tail is composed of articulations which enter one into the other, and is terminated by two threads.

It is on one of these—the *Furcularia* or *Rotifère des toits*—that Spallanzani performed his famous experiments. Covered with dust in the spouts on the roofs of houses it becomes desiccated, and after remaining in that state for several weeks reacquires life and motion on being humected with a little water.

The TRICHOCERCÆ, Lam., appear to me to differ from the Furculariæ only in the diminished development of their vibratile organs(1). The

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(1) For the organization of these animals, see the Memoir of M. Dutrochet, Ann. du Mus. XIX, p. 355.

VAGINICOLA, Lam.

Seem to be Trichocercæ with a diaphanous envelope; but we may be allowed to fear there has been some optical illusion(2).

TUBICOLARIA, Lam.

The Tubicolariæ only differ from the Furculariæ, by secreting themselves in little tubes which they construct of foreign molecules, but which do not form any portion of their body, like those of the Coralliferi (polypiers). Their rotatory organ however shows itself out of the tube, nearly in the manner of the head of Polypi.

There is a species in France common on the Confervæ of the marshes—*Vorticella tetrapetala*, Blumenb.; Dutrochet, Ann. du Mus., XIX, xviii, 1—10—whose rotatory organ is divided into four lobes.

BRACHIONUS, Mull.

The Brachioni, with rotatory organs and a tail nearly similar to those of the Furculariæ, have a sort of membranous or squamous shield, which covers their back like that of certain Monoculi.

ORDER II.

HOMOGENEA.

The body of the Homogenea presents neither viscera nor other complication, and is frequently destitute of even the appearance of a mouth.

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(1) *Trichoda paxillum*, Müll., XXIX, 9—12; Encyc., XV, 19, 20;—*Trich. longicauda*, Müll., XXXI, 10.

(3) *Trich. innata*;—*Tr. ingenita*;—*Tr. inquilina*, Müll.

The first tribe comprises those, which, with a gelatinous body more or less contractile in its different parts, still present external organs consisting of cilia more or less strong.

When they have the form of a horn (cornet), from which the cilia issue as in the Polypi called *Vorticellæ*, we have the

UREOLARIA, Lam.

When the body is flat, and these cilia are at one extremity,

TRICHODA.

When they surround the whole body,

LEUCOPHRA.

When some of them are stout, and represent species of horns,

KERONA.

And when these pretended horns are elongated into threads,

HIMANTOPES.

The second tribe consists of those which exhibit no external organ whatever, if we except a tail. In

CERCARIA, Mull.

The oval body is in fact terminated by a thread. To this genus belong (among others) those animalcules which are observed in the semen of various animals, and on which so many fantastic theories have been founded.

When this thread is forked, as is sometimes the case, we have the FURCOCERCA of Lamarck.

VIBRIO, Mull.

Where the body is round and slender like a bit of thread.

It is to this genus that belong the

V. glutinis et aceti, or the pretended *Eels* that are seen in *vinegar* and *paste*. Those that inhabit the former are frequently perceptible to the naked eye. It is asserted that they change their skin, consist of two sexes, produce living young ones in summer, and eggs in autumn. Freezing will not kill them. The others make their appearance in diluted paste.

ENCHELIS, Mull.

Where the body is oblong, softer, and less determined than that of a Vibrio. In

CYCLIDIUM

It is flat and oval. In

PARAMECIUM

It is flat and oblong. In

KOLPODA

It is flat and sinuous. In

GONIUM

It is flat and angular. And in

BURSARIA

Hollow like a sac.

The most singular genus of the whole is the

Proteus, Lin.

No determinate form can be assigned to them; their figure changes every instant, and is sometimes rounded, sometimes divided and subdivided into thongs, in the most odd and singular manner(1).

Monas, Mull.

The Monades, viewed under the microscope, resemble points moving with great rapidity, although destitute of any apparent organ of motion.

Volvox.

A globular body revolving on its axis and frequently containing smaller globules which are doubtless the continuation of the race.

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(1) *Proteus diffluens*, Rœs., III, ci; Encyc., I, 1, a—m;—*Prot. tenax*, Müll., Inf., II, 13—18; Encyc., I, 2, a—f.

For other details concerning all these animals, see the posthumous work of Othon Frederick Müller, entitled, *Animalcula Infusoria*, the plates of which have been copied in the Encyc. Méthodique. See also Rœs., III, and for the classification, the work already quoted of M. Bory Saint-Vincent.

(2) M. Audouin and M. Edwards, Ann. des Sc. Nat.; XI, pl., XVI have adopted this opinion of M. Grant.

EXPLANATION OF THE PLATES.

Plate I.

Fig. 1. *Pneumora scutellaris*, of the natural size. The female is apterous, pale-green with white spots, largest on the thorax, and yellowish ones on the abdomen, both arranged in longitudinal series and margined with red; three on each side of the dorsal carina, forming little oblique bands; edges of the thorax denticulated.—Muséum d'Histoire Naturelle; brought from the Cape of Good Hope by Lalande.

Fig. 2. *Nemestrina longirostris*, of the natural size, described under its specific name by M. Wiedemann. It is blackish and furnished with a yellowish down, and several pearl-grey spots on the thorax and abdomen; this last part of the body is crossed transversely by blackish and russet bands; the spots are placed on the former; sides provided with bundles of black hairs. The wings are blackish and marked with little spots, and the posterior margin is transparent. The proboscis is from three to four times the length of the body. The legs are russet. From the Cape of Good Hope.

Fig. 3. *Coreus phyllomorphus* (subgenus Syromastes) of the natural size. This species is allied to the *Coreus paradoxus* of Fabricius, but is rather less pilose and proportionally shorter and wider; the abdomen is almost square, and its lateral edges exhibit three dentations anteriorly and two lobes behind; each side of the posterior edge is marked by a little incisure. The sides of the body are slightly turned up, it is greyish and somewhat diaphanous and veined; its edges and the first joint of the antennæ are bristled with little spines. From Senegal; where it was taken by M. Dumolin of the Navy, who sent it to M. Guerion by whom it was presented to the Paris Museum.

Fig. 4. *Synagris spiniventer*, of the natural size. The female is black, with violet-blue wings, and the posterior extremity of the abdomen saffron; the under part of the second ring is armed

with two tolerably stout spines. From Senegal, and presented to the Paris Museum by the same naturalist.

Fig. 5. The abdomen of the same insect viewed from beneath.

Fig. 6. *Myrmeleo clavicorne*, of the natural size. Body whitish with black points on the thorax; antennæ terminated in a little rounded button; small black spots, some of which are almost punctiform, and the others, those on the inner margin particularly, forming little lines, on the superior wings; other lines of the same colour, some of which are bifid posteriorly, at the extremity of the inferior ones; a larger and almost rounded black spot on their middle. From Senegal and presented to the Museum by the same gentleman.

Plate II.

Fig. 1. *Smerinthus Dumolinii* of the natural size. Wings indented and of an obscure greyish-brown; the superior ones with two or three little, slightly marked, sinuous, whitish-grey lines, and a broad band of olive-brown which does not reach the base, marked with a white dot and a trilobate spot of a similar colour; extremity of these same wings with a paler brown and strongly indented band. Inferior surface of the four wings paler than the superior, and with a broad black spot on the middle of each, near the edge.

Thorax deep-grey and olive-brown in the centre; origin of the abdomen of the same colour; antennæ white, and smallest in the female.

The caterpillar, like those of all the Smerinthi, has a triangular head, and is annulated with black and red; the whole body is sprinkled with blackish points. From Senegal; on the Baobab, where M. Dumoulin discovered two specimens. Collection of Count Dejean.

Fig. 2. *Castnia Hubneri* of the natural size. Superior wings white, with two oblique, white, and almost maculated bands beyond the middle of the wings. Inferior wings blackish with a reddish border and base; two ranges of large dots, near the extremity of the posterior and marginal ones, are of a minium-red, and the others white. The under surface of the four wings presenting a similar design to that above, but almost entirely reddish, with the exception of the middle of the inferior ones, and the external edge of the terminal band of the superior, which are black.

The abdomen agrees in colour with the wings. From South America. Collection of Count Dejean.

Fig. 3. *Ægocera Boisduvalii,* of the natural size, the third species of the genus that is known. Superior wings vinous-brown with three white bands; one extending along the whole inner margin, the other very short and proceeding from the edge, and the third likewise proceeding from the edge and descending obliquely near the external margin; four violet-grey, metallic spots. Posterior wings yellow with a lunula, and the extremity light-brown; thorax white with vinous-brown pterygoda; abdomen yellow with a series of black points superiorly; antennæ more slender than those of the *Ægocera venulia.* From the western coast of Africa. Cabinet of M. Boisduval.

Fig. 4. *Coronis Durvillii,* of the natural size. Superior surface of the upper wings olive-brown, with an oblique, serrated, whitish band near the middle; that of the base more or less violet, and the middle one slightly tinged with olive on the inner margin which alone is dentated; at the extremity, near the fringe, is a double greyish line, the external one denticulated; the posterior wings, terminated by a moderate tail, are somewhat spatulate, and present in the middle a band of bright violet-blue, very broad near the edge, and terminating in a point near the anal angle. The under part of the whole four is of a pale-olive-brown with a white band on the middle of each, and the extremity of a yellowish-grey. From Cayenne. Cabinet of M. Boisduval.

Plate III.

Fig. 1, 2. An extraordinary species of Floriceps found in the liver of the *Diodon Mola.* It is enveloped in a membranous sac (fig. 1), which appears to be connected in some way with its body, and to enjoy the faculty of voluntary contractions.

Fig. 3. The sac opened and the animal exposed.

Fig. 4. The *Chondracanthus* of Laroche, and fig. 4, another of those parasites allied to the Caligi, which have been taken for Lerneæ, and which is from the Trigla.

Fig. 5. *Brachiella thynni.*

The other figures are sufficiently explained in the text, for which see their genera by Index, as well as those of the plate generally.

Fig. 6 exhibits the filaments issuing from the anus. Its numerous tentacula must protrude through the opposite opening.

CATALOGUE OF AUTHORS.

In explaining the abbreviations employed to indicate the numerous writers necessarily referred to in this work, we have embraced the opportunity of giving the reader a general idea of their profession, the period of their birth and decease, and of the character of their writings.

Abild.—Abildgaardt (Peter-Christian), a Danish naturalist; Professor at Copenhagen, died in 1808.

One of the continuers of the Zoologia Danica of Müller, and author of various Memoirs published among those of the Society of Natural History, and of The Royal Society of Sciences of Copenhagen, as well as those of the Society of Naturalists of Berlin.

Acad. des Sc.

I thus quote the "Mémoirs de l'Académie des Sciences" of Paris, of which one quarto volume was annually published from 1700 to 1790.

I have also occasionally quoted the "Mémoirs des Savants Etrangers," eleven volumes, from 1750 to 1786.

I have also frequently quoted the "Memoirs of the Academy of Berlin" from 1819, and the new ones of the Academia Naturæ Curiosorum of Bonn, from Vol. IX, at which epoch they assumed their new form.

For those of the Academy of Petersburg see Peterob. or Petrop.

Acosta or rather **Mendez da Costa** (Emmanuel), a Portuguese naturalist, resident in London.

"Historia Naturalis Testaceorum Britanniæ," 1 vol. 4to. London, 1778.

Adanson (Michael), born at Aix in 1727, and died in Paris 1806, Member of the Académie des Sciences, and one of the first naturalists who attempted the classification of Shells according to their animals.

"Histoire Naturelle des Coquillages du Sénégal," 1775, 1 vol. 4to.

Agassis, a German naturalist.

Editor of the "Fishes of Spix," and author of Memoirs in the Isis.

Ahr.—Ahrens.

"Augusti Ahrensii, Fauna Insectorum Europæ, fascic. I—XII."

Alb. or Albin.—Albin (Eleazar), an English painter.

"A Natural History of Birds," 3 vols. 4to. London, 1731—38, containing 306 indifferent coloured plates.

"A Natural History of Spiders," 1 vol. 4to, with plates. London, 1736.

Albinus (Bernard-Sigefroy), Professor at Leyden, and one of the great anatomists of the eighteenth century, born at Frankfort in 1697, died in 1770.

We have only had occasion to quote him for the description of the Pennatulæ inserted in the "Annotationes Academicæ," 8 Nos. in 4to. Leyden, 1754—1768.

Aldrov. or Aldr.—Aldrovandi (Ulysse), a nobleman of Bologna, Professor of the University of Bologna, born 1525, died blind 1605.

His "Natural History," in fourteen volumes, folio, from 1599 to 1640, eleven of which are on the subject of animals, was mostly published by his successors. The third volume of the Ornithology and the first of the Insects were the only ones published during his life. It is an undigested and wearisome compilation.

Amor.—Amoreux (N.), a physician of Montpellier.

"Notice des Insectes de la France, réputés Venimeux," 1 vol. folio, with plates. Paris, 1786.

"Description Méthodique d'une espèce de Scorpion commune à Souvignargues, en Languedoc." Journal de Physique, XXXV.

Anders.—Anderson (John), a merchant and burgomaster of Hamburg, born in 1674, died in 1743.

"Histoire Naturelle de l'Islande du Groënland," &c. 2 vols. 8vo. Paris, 1750.

This work, although antiquated and superficial, is still the principal source of our information relative to the Cetacea.

Andreæ (John Gerard Reinhard), druggist at Hanover, born in 1724, died in 1793.

"Letters written from Switzerland to Hanover, 1763," in the German Language. They were at first printed separately in the Hanover Magazine for 1764—65, and republished in 1 vol. 4to. Zurich, 1776.

Ann. Mus. or du Mus.—"Annales du Museum d'Histoire Naturelle de Paris," by the professors of that establishment, 20 vols. 4to, from 1802 to 1813.

This work is continued under the title of:

"Mémoires du Muséum d'Histoire Naturelle," &c. Paris, 1815, et seq. Eighteen volumes have been published.

Argenv.—Argenville (Antoine Joseph Des-Alliers d'), maitre des Comptes of Paris, born 1680, died 1765.

" L'Histoire Naturelle Eclaircie dans une de ses principales parties, la Conchyliologie," 4to, first edition. Paris, 1742; the second augmented by the addition of the Zoomorphose, ibid., 1757; the third augmented by M. Favaune, 2 vols. ibid., 1780.

Arted.—Artedi (Peter), a Swedish naturalist, and a friend of Linnæus, born in 1705, drowned at Amsterdam in 1735.

His work on Fishes was published by Linnæus. " P. Artedi Ichtyologia sive Opera Omnia de Piscibus," 1 vol. 8vo. Leyden, 1738.

The edition of Walbaum, " Artedius Renovatus," 5 vols 8vo, Gripswald, 1788—89 is greatly augmented, but by an injudicious compiler.

Ascan.—Ascanius (Peter), Professor at Copenhagen.

Author of five numbers in folio, the first containing " Coloured Illustrations of the Natural History of the North," from 1767 to 1779.

Audeb.—Audebert (Jean-Baptiste), a painter at Paris, born in Rochefort, 1759, died 1800.

" Histoire Naturelle des Singes et des Makis," folio, Paris, 1800 with sixty-two plates drawn from the stuffed specimens in the Museum.

" Oiseaux Dorés ou à Reflets Métalliques," 2 vols. folio, Paris, 1802.

Aud.—Audouin (Jean-Victor), Doctor of Medicine, sub-librarian to the Institute of France, assistant naturalist to Messrs de Lamarck and Latreille at the Jardin du Roi, and member of various societies, born in Paris, 27th of April 1797.

" Anatomie d'une Larve Apode" (Conops), found in a Bombus lapidarius, by Messrs Lachat and Audouin, 1818.

" Mémoire sur les rapports des Trilobites avec les Animaux Articulés," published with plates in the Annales Générales des Sciences Physiques, VIII, p. 233.

" Mémoires sur l'Achlysie, Nouveau Genre d'Arachnide," published with plates in the Annales des Sciences Naturelles, II, p. 497.

" Lettres sur la Génération des Insectes addressée à l'Académie des Sciences," published in the Annales des Sciences Naturelles, II, p. 281.

" Recherches Anatomiques sur la Famille du Drele et sur le Mâle de cette Espéce," published with plates in the Annales des Sciences Naturelles, II, p. 443.

" Recherches Anatomiques pour servir à l'Histoire Naturelle des Cantharides," published with plates in the Annales des Sciences Naturelles, IX, p. 31.

" Prodrome d'une Histoire Naturelle, Chimique, &c., des Cantharides," a medical thesis for the degree of M.D., 4to. Paris.

" Mémoire sur la Nicothoé," a new genus of the Crustacea which lives on the blood of the Lobster. Messrs Audouin and Milne Edwards, published in the Annales des Sciences Naturelles, IX, p. 345.

" Memoire sur l'Anatomie et la Physiologie des Crustacés," published in the same work.

" Explication Sommaire, &c." of the plates in the great work on Egypt, the publication of which had been interrupted by the indisposition of M. Savigny. To M. Audouin also, in conjunction with M. Geoffroy Saint-Hilaire, we are indebted for the description of the Mammalia.

" Observations pour servir à l'Histoire de la Formation des Perles," inserted in the Memoires du Muséum d'Histoire Naturelle, 1829.

"Mémoires sur plusieurs Mollusques, entre autres sur la Glycimère, sur une Clavagelle vivante, genre Siliquaire, et sur le genre Magile," presented to the Académie des Sciences in 1829, and republished from that work in the review of the Annales des Sciences Naturelles.

With Milne Edwards.

"Résumé d'Entomologie ou d'Histoire Naturelle des Animaux Articulés," 2 vols. 18mo, Paris, 1829.

"Histoire Naturelle des Animaux du littoral de la France," still in MS.

Azz.—De Azzara (Don Felix) a Spanish officer, born 1746, has given us two excellent works on the natural history of Paraguay.

"Essai sur l'Histoire Naturelle des Quadrupèdes du Paraguay," translated from the manuscript by M. Moreau de Saint-Méry, 2 vols 8vo, Paris, 1801.

"Voyages dans l'Amérique Méridionale de 1781, jusqu'en 1801," translated by M. Walckenaer, 4 vols 8vo, Paris 1809. The two last volumes, translated by Sonnini, contain the natural history of the Birds of Paraguay.

Bajon, formerly staff-surgeon at Cayenne.

"Mémoires pour servir á l'Histoire de Cayenne," &c., 2 vols 8vo, Paris, 1777. They contain some details relative to the animals of that country.

Barr.—Barrere (Pierre), Professor at Perpignan, died 1753.

"Essai sur l'Histoire Naturelle de la France Equinoxiale," I vol. 12mo, Paris, 1741.

"Ornithologiæ Specimen Novum," 1 vol. 4to. Perpignan, 1745.

Barton (Benjam. Smith) an American naturalist and Professor of Botany and Materia Medica in the University of Pennsylvania at Philadelphia, died 1816.

"A Memoir on the power of fascination attributed to the Rattlesnake," 1 vol. 8vo. Philadelphia, 1796.

"Facts, Observations and Conjectures on the generation of the Opossum," pamphlet in 8vo. Philadelphia, 1801.

"Some Notice of the Sirena lacertina, and of another species of the same genus," pamphlet, 8vo. Philadelphia, 1808.

"Memoir on a Reptile called the Hellbender," pamphlet, 8vo, 1812. It is the *Salamandra gigantea.*

Bartram (William), an American Botanist.

"Voyage dans les parties sud de l'Amerique Septentrionale," translated from the English by M. Benoits, Paris, 2 vols. 8vo.

Baud.—Baudet de la Face (Marie-Jean).

"Essai sur l'Entomologie du Départment du Puy-de-Dôme," a Monograph of the Lamellicornes, 1 vol. 8vo. Clermont, 1809.

Bast.—Baster (Job), a Physician of Harlaem, fellow of the Royal Society of London, born 1711, died 1776.

"Opuscula Subsecivа," 1 vol. 4to, divided into two volumes with plates, Harlaem, 1764 and 1765.

Basterot (B. de), a Lawyer.

"Mémoire Géologique sur les Environs de Bourdeaux, 8vo. Paris, 1825.

Beauv.—Beauvois (Palisot de). See Palisot.

Bechst. or **Bech.—Bechstein** (J. M.), a naturalist of Saxony, born 1757.

"The Common Natural History of Germany," 4 vols 8vo, Leipsig, 1801—1809, in the German language. It only treats of the Quadrupeds and Birds.

Bell (Thomas).

Author of various Memoirs on Reptiles in the Linnæan Transactions, Zoological Journal, &c.

Bel.—Belon (Pierre), a Physician at Mans, and a Professor of the College of France, born 1517, died 1564.

"Observations faites dans mes Voyages en Orient," 1 vol. 4to, 1553.

"Histoire des Poissons," 1 vol. 8vo. Transv., 1551.

"Histoire Naturelle des étranges Poissons Marins, et Description du Dauphin, &c." 1 vol. 4to, 1551.

"Histoire Naturelle des Oiseaux, 1 vol folio, 1551.

Bennet (E. T.), an English naturalist.

Author of several Memoirs in the Zoological Journal.

Bennet (J. Whitchurch), an English naturalist.

"Natural History of the Fishes of Ceylon," of which but two numbers, in 4to, are yet published. The plates are beautiful.

Bergius (Peter-Jonas), a Swedish naturalist, Professor at Stockholm, died 1790.

Quoted as author of certain Memoirs among those of Stockholm.

Beseke (John Melchior Theophilus), Professor at Mittau in Courland, born 1746. Author of

"Materials for the History of the Birds of Courland" (in German), 8vo, 1792, Mittau and Leipzic.

Bendant (F. S.), a French naturalist, &c., member of the Académie des Sciences, quoted for his

Memoirs on Shells, published in the Annales du Muséum.

Besler or **Mus. Besler** (Michael Robert), a physician at Nuremberg, born 1607, died 1661.

"Rariora Musei Besleriani," folio, 1716.

Blainv.—Blainville (Henri Ducrotay de), adjunct Professor to the Faculté des Sciences, and member of the Académie des Sciences.

I quote several of his Memoirs on all the branches of Zoology, published in the Annales du Museum, Bulletin des Sciences, Journal Physique, and his articles Mollusques and Vers, in the Dictionnaire des Sciences Naturelles. The first is printed separately under the title of Malacologie. Paris and Strasb., 8vo, 1828, with 1 vol. of plates.

"Mémoire sur les Bélemnites," 4to. Paris, 1827.

"Essai d'une Monographie de la Famille des Hirudinées, 8vo. Paris, 1827.

Bl.—Bloch (Mark-Eleazer), a Jewish physician in Berlin, born at Anspach 1723, died 1799. His

"Icthyology or General and Particular History of Fishes," in twelve numbers, folio, with 432 plates, Berlin, 1785—1796, is far from being general. It only contains such species as he could procure, and almost all the foreign ones are badly coloured. His

"Systema Icthyologiæ"—See Schneider—also includes the species of other authors, but arranged in a fantastic manner.

"A Treatise on the Generation of Intestinal Worms" (in German), 4to. Berlin, 1782.

Blum. or Blumenb.—Blumenbach (John Frederick), Professor of Medicine and Natural History at Gottingen.

"Manual of Natural History," 8th edition (in German), 1 vol. 8vo. Gottingen, 1807. There is also a French translation of the same by M. Artaud, 1 vol. 8vo, Metz, 1803.

"Plates of Natural History" (Abbildungen), 10 numbers, 8vo, each consisting of 18 plates. Gottingen, 1796—1810.

Boccone (Paul), a Bernardine monk of Sicily, born in 1633, died 1704.

"Recherches et Observations Naturelles," &c., 1 vol. 12mo. Paris, 1671.

Bodd.—Boddaert (Peter), Physician, &c., of Flessingen, in Zealand.

"Elenchus Animalium, vol. 1, sistens Quadrupedia," 8vo, Rotterdam, 1785. The sequel has not appeared.

Four letters on as many animals of the Cabinet of Schlosser, following that of the latter, and even on the Lacerta amboïnensis.

Bohatsch (John Baptist), Professor at Prague, died 1772.

"De quibusdam Animalibus," &c. 1 vol, 4to. Dresden, 1761.

This work contains some good observations on certain Mollusca and Zoophyta.

Boie, a young naturalist of Kiel, who died in Java. His voyage was undertaken for scientific purposes.

He had prepared extensive materials for publication on the Reptilia.

Bojanus (Louis Henry), a German naturalist, Professor at Vilna, died 1828.

"Monograph of the Fresh-water Tortoises of Europe," folio, Vilna, 1819, an excellent work. He was also the author of several Memoirs in the Isis.

Boisd.—Boisduval (J. A.), physician and curator of the cabinet of count Dejean.

"Essai sur une Monographie des Zygenides," 1 vol. 8vo, with plates. Paris 1829.

"Europæorum Lepidopterorum Index Methodicus," added to the Essay, &c.

He has lately, jointly with major Le Conte of the United States army, published the three first numbers of another work, entitled

"Histoire Generale et Iconographie des Lépidoptères or des Chenilles de l'Amerique Septentrionale," 8vo. Paris.

The same gentleman, in conjunction with count Dejean, has also published the first numbers of another, called the

"Iconographie et Histoire Naturelle des Coléeptères d'Europe," 8vo. Paris, 1827.

He has also described some new species of Lepidoptera in the Annales de la Société Linneenne de Paris.

Bomme (Leonard), a physician in Zealand.

Author of certain Memoirs published among those of the Society of Sciences of Flessingen, or Flushing.

Bon, or **Bonan.—Bonanni**, or rather **Buonanni** (Filippo), a jesuit professor at the college of Rome, born 1638, died 1725. He was an assiduous observer, but we have only quoted his work entitled

"Recreatio Mentis et Oculi in Observatione Animalium Testaceorum," 1 vol. 4to. Rome, 1684.

Bonap. or **Ch. Bonap.**—Bonaparte (Charles Lucien), Prince of Musignano, son of the prince of Canino.

Author of an excellent Supplement to Wilson's American Ornithology, and of several memoirs in the Annals of the Lyceum of New York.

Bonnat.—Bonnaterre (the Abbé), Professor of natural history at Tulle.

He superintended the engraving of the plates of the Vertebrata for the Encyclopedie Methodique, and gave the text for those of the Reptiles and Fishes.

His figures generally are copied from authors, and not always judiciously selected.

Bonel.—Bonelli (Francesco), director of the Cabinet of Natural History, and professor of Zoology at Turin.

"Catalogue of the Birds of Piedmont," pamphlet, 4to, 1811.

"Entomological Observations," in two parts, published in the Memoirs of the Academy of Sciences of Turin. They treat of the genus Carabus of Linnæus, or of the Carabici.

He also published other Memoirs, of which we may particularly notice the "Descrizione di sei nuovi Insetti Lepidopteri della Sardegna," in the thirtieth volume of the same collection.

Bonnet (Charles), a celebrated philosopher and naturalist of Geneva, born in 1720, died 1793. We only quote his

"Traité d'Insectologie," 2 vols, 8vo, Paris, 1745, and in the first volume of his works in 4to. Neufchâtel, 1769.

Bont.—Bontius (Jacques), physician general at Batavia in the commencement of the seventeenth century.

"Historiæ Naturalis et Medicæ Indiæ Orientalis, libri VI," printed as a sequel to the work of Pison, "De Indiæ utriusque re Naturali et Medica."

Borlasse (William), an English ecclesiastic, curate in the county of Cornwall, born in 1696, died 1772.

"Natural History of Cornwall," 1 vol. folio. Oxford, 1758.

Born (Ignatius de), a Transylvanian naturalist and celebrated mineralogist, born 1742, died 1791.

"Testacea Musei Cæsarei Vindobonensis," 1 vol. folio. Vienna, 1780.

Bory-Saint-Vincent, a naturalist of Bourdeaux, who accompanied Captain Baudin to the Isle of France, and late president of the Commission of Natural History in the Morea.

"Voyage aux quatres principales isles d'Afrique." This work, which we have quoted, contains various interesting Zoological observations.

"Essai d'une Classification des Animaux Microscopiques," 8vo. Paris, 1826.

He also furnished the explanations of the latter part of the plates of the article Vers, in the Encyclopédie Méthodique.

"Essai Monographique sur les Oscillaires," 8vo. Paris, 1827.

Various articles in the Dictionnaire Classique d'Histoire Naturelle, of which he is the principal editor.

Bosc (Louis), member of the Académie des Sciences.

Author of numerous memoirs in the Actes de la Societé de l'Histoire Naturelle, the Bulletin des Sciences, &c. and of the Histoires Naturelles des Vers, des Coquilles et des Crustacés, which form a sequel to Déterville's small edition of Buffon.

Bosman (William), a Dutch merchant, who lived in the seventeenth century.

"A Voyage to Guinea," 1 vol. 8vo., Utrecht, 1705, containing original notes on various animals.

Boud.—Boudier (Henri Philippe), druggist,

Has published in the Annales de la Societé Linneenne de Paris, the description of a new species of Lema for the Faune Francaise.

Bourguet (Louis), professor at Neufchatel, born 1678, died 1742.

" Traité des Petrifications," 1 vol. 4to, Paris, 1742.

Bowdich, an English naturalist.

Author of a Journey to Ashantee, and of a Voyage to Madeira, which contain various observations relative to natural history.

Bowdich (Mrs.), now Mrs. **Lee**,

Is publishing a History of the Fresh-water Fishes of Great Britain, with splendid plates. London 1828, 1829.

Brander (Gustavus), an English naturalist, died 1787.

" Fossilia Hantoniensia Collecta et in Museo Britannico deposita, 4to. London, 1766.

Brantz, a young Dutch naturalist.

" Memoir on the Euriotis," the same Rat as our Otomys.

Brebis.—Brebisson, member of the Societé Linnéenne of Calvados.

" Catalogue Methodique des Crustaces Terrestres, Fluviatiles et Marins, recueillis dans le department du Calvados," 8vo.

Brehm (Christian-Louis), a German clergyman.

" Materials for a History of Birds" (in German), 8 vols 8vo. Neustadt, 1820, 1822.

Bremser, curator of the imperial cabinet of Vienna.

" On the Worms that inhabit living Man" (in German), 4to. Vienna, 1819. It has been translated into French by Dr. Grundler, with additions by M. de Blainville, 8vo. Paris, 1824.

Breyn.—Breynius (John Philip), a naturalist and physician of Dantzick, born 1680, died 1764.

" Dissertatio de Polythalamiis, nova Testaceorum classe," 4to. Dantzick, 1732.

" Historia Naturalis Cocci radicum Tinctorii," 1 vol. 4to. Gedani, 1731.

Briss.—Brisson (Mathurin Jacques), professor of natural philosophy, member of the Académie des Sciences, and in his youth curator of the cabinet of natural history of Réaumur; born 1723, died 1806.

" Le Règne Animal divisé en IX classes," 1 vol. 4to. Paris, 1756. It only contains the Quadrupeds and Cetacea.

" Ornithologie," 6 vols 4to. Paris, 1770. A useful work on account of the minute exactness of the descriptions. The plates were drawn by the same hand that furnished the figures of the Planches Enluminées of Buffon, and are frequently taken from the same specimens.

Brit. Zool.

Under this title we quote the large anonymous folio with fine plates, called "British Zoology," printed in London in 1766. It is by Pennant, and has been reproduced by him under the same title in 4 vols 8vo. See Pennant.

Brocchi (G.), a military engineer, died 1828 at Syria, in the service of the Pacha of Egypt.

"Conchiologia Fossilis Subappennina," 2 vols 4to. Milan, 1814.

Brongn.—Brongniart (Alexander), member of the Académie des Sciences, and professor of the Faculté des Sciences de Paris, and of the Jardin du Roi, born 1770.

"Essai d'une Classification Naturelle des Reptiles," 4to. Paris, 1805.

I also quote his works on the Fossil Shells—"Coquilles Fossiles"—both in the Annales du Museum, and our joint publication on the geography of the environs of Paris. I also refer to his

"Histoire des Crustacés Fossiles," 4to, published by him and M. Desmarest. Paris, 1812.

Brouss.—Broussonnet (Pierre-Marie-Auguste), perpetual secretary to the Societé d'Agriculture, and member of the Académie des Sciences; born 1761, died 1807. I quote his

"Memoire sur les Chiens de Mer," in the Memoires de l'Académie des Sciences, 1780. Also his

"Icthyologia, 4to, of which but one decade was published. London and Paris, 1782.

Brown Jam.—Brown (Patrick), an Irish physician, resident in Jamaica.

"The Civil and Natural History of Jamaica," 1 vol. folio. London, 1756.

Brown or **Br.—Brown** (Peter), an English painter.

"New Illustrations of Zoology," 1 vol. 4to, London, 1776, with fifty coloured plates of animals of various classes—all of them indifferently executed.

Bruce (James), the celebrated Scotch traveller, born 1730, died 1794.

"Travels in Abyssinia and to the Sources of the Nile." I quote the French translation, 5 vols 4to. Paris, 1790.

Brug.—Brugieres (Jean-Guillaume), a physician at Montpellier, and a traveller, born 1750, and died at Ancona on his return from Persia, 1799. I quote his

"Dictionnaire des Vers," published in the Encyclopedie Methodique. But one volume, 4to, has appeared. Paris, 1792. I also quote his

"Figures de Vers," for the same work, of which there are four.

Brun.—Brunnick (Martin Thomas), a Danish naturalist, Professor at Copenhagen.

"Icthyologia Massiliensis," &c., 1 vol. 8vo. Copenhagen and Leipsic, 1768.

"Entomologia sistens Insectorum Tabulas Systematicas," 8vo. Copenhagen,

1764. Also various Memoirs published among those of the Society of Sciences, and of the Society of Natural History of Copenhagen.

Buchan.—Buchanan (Dr Francis Hamilton), a Scotch physician at Bengal, died 1829.

Author of certain Memoirs in the Transactions of the Linnæan Society, and of a Journey from Madras through the Mysore, Canary, &c., which contain several valuable observations. We are particularly indebted to him for

"A Natural History of the Fishes of the Ganges," 1 vol. 4to, with a great number of excellent plates. Edinburgh, 1822.

Buckland (William), professor of Geology at Oxford, author of the

"Reliquiæ Diluvianæ, 4to, London, 1825, and of numerous Memoirs on fossils.

Buff.—Buffon (Georges-Louis-Leclerc, Comte de), Intendant of the Jardin du Roi, and Treasurer of the Académie des Sciences, born 1707, died 1788.

"Histoire Naturelle, generale et particuliere, avec la Description du Cabinet du Roi." I always quote the Paris edition of 1749—1789, in 36 vols 4to, of which *three* are general, *twelve* relate to Quadrupeds, *seven* are supplements to his general observations and to the Quadrupeds, *nine* treat of Birds, and *five* of Minerals.

Buf. Enl. or Enlum. See **Planches Enluminees.**

Bullet. des Sc.

"Bulletin des Sciences pour la Societé Philomatique," a journal which has appeared monthly since 1791, which contains a multitude of abridged and valuable observations relative to Natural History.

Burchell, an English traveller.

"Travels in the Interior of Southern Africa."

Carena (Giacinto), professor at Turin.

"Monograph of the Genus Hirudo," vol. XXV of the Memoirs of the Academy of Turin, 4to, 1820.

Carmich.—Carmichael, an English officer.

I quote his Memoir on the Fishes of Tristan d'Acunha. Lin. Trans., XII.

Carus (Charles-Gustavus), Professor at Dresden.

Author of several works on Comparative Anatomy. I quote his Memoir on the circulation in the Larvæ of the Neuroptera, printed in German, 4to. Leipsic, 1827.

Cat. Catesb.—Catesby (Mark), a traveller in North America, born 1680, died 1749.

"The Natural History of Carolina, Florida, and the Bahama Islands," 2 vols folio, with an Appendix and two hundred and twenty coloured plates. London, 1731, 1743.

Cauche (François), of Rouen, a soldier or sailor at Madagascar, died 1638.

"Une Relation de Madagascar," &c. 1 vol. 8vo, 1631.

Cavolini (Filippo), a physician and naturalist at Naples.

"Memorie per servire alla Storia de' Polipi Marini," 4to. Naples, 1785.

"Sulla Generazione dei Pescie dei Granchi," 1 vol. 4to. Naples, 1787.

Cetti (Francesco).

"Storia Naturale di Sardegna," 4 vols 12mo. Sassari, 1774—1777.

Chabert, director of the Ecole Veterinaire at Alfort.

"Traité des Maladies Vermineuses dans les Animaux," pamphlet, 8vo. Paris, 1782.

Chab.—Chabrier (J.), a corresponding member of the Societé d'Histoire Naturelle.

He published a series of Memoirs on the flight of Insects, in the Annales du Museum d'Histoire Naturelle. A certain number of impressions were taken separately, which form his "Essai sur le Vol des Insectes," 1 vol. 4to. Paris, 1823.

Chamisso (Adelbert de), a distinguished literary gentleman and naturalist of Berlin, who sailed round the world with Captain Kotzebue.

I quote his Memoir on the Salpæ (in Latin), 1 vol. 4to. Berlin, 1830.

Charp.—Charpentier (Toussaint de).

"Horæ Entomologicæ," 1 vol. 4to, with plates. Breslau, 1825.

Chemn.—Chemnitz (John Jerome), of Magdeburg, chaplain to the garrison of Copenhagen, born 1730.

He continued the great work on Conchyliology of Martini, and is the author of various Memoirs published among those of the Society of Naturalists of Berlin, of Copenhagen, and of the Naturforscher.

Choris (Louis), a Russian painter, who accompanied Captain Kotzebue in his voyage round the world. He was assassinated near Vera-Cruz, when about to commence his travels in Mexico.

"Voyage Pittoresque autour du Monde," folio. Paris, 1822.

"Vues et Paysages des Regions Equinoxiales," folio. Paris, 1826.

Clairv.—Clairville, an English naturalist, residing in Switzerland.

"Entomologie Helvetique," 2 vols 8vo, in French and German, with excellent plates. The first volume was published in 1798, and the second in 1806; both were printed at Zurich.

Clarck, an English Veterinary Surgeon.

"A Monograph of the Œstri," in the third volume of the Linnæan Transactions. He has published a second edition of it.

Clerc (Charles), a Swedish painter and a pupil of Linnæus.

"Aranei Suecici Descriptionibus et Figuris Illustrati," 1 vol. 4to, in Swedish and Latin. Holmiæ, 1757.

"Icones Insectorum Rariorum," 1 vol. 4to. Holmiæ, 1759—1764. This work is useful as an indication to the Lepidoptera described by Linnæus, from the Cabinet of Queen Frederica Ulrica.

Cloquet (Jules), a physician and surgeon of Paris.

"Anatomie des Vers Intestinaux," 4to. Paris, 1824.

Clus.—Clusius, or **l'Ecluse** (Charles), born at Arras 1526, died 1609. He was physician to the Emperor, and subsequently a professor at Leyden.

"Exoticorum Libri X," 1 vol. folio. Anvers, 1605.

Collet Meygnet (G. F. H.), physician.

"Memoire sur un Ver trouvé dans le rein d'un Chien" (the *Strongylus gigas*), inserted in the Journal de Physique, vol. LV.

Fab. Col.—Columna (Fabius), a physician at Rome, an illegitimate descendant of the illustrious house of Colonna, born 1567, died about 1660. He was an exact and erudite observer.

"De Purpura," 4to, 1616.

"Aquatilium et Terrestrium aliquot Animalium, aliarumque Naturalium Rerum Observationes," printed at the end of his Ecphrasis, ib., 4to, 1616.

Com. or **Commers.—Commerson** (Philibert), born at Dombes in 1727, and died at the Isle of France 1773. A most indefatigable traveller and learned naturalist.

I quote his manuscripts and drawings deposited in the Library of the Museum.

Cook (Captain), the celebrated navigator, born 1728, and killed at the Sandwich Islands in 1779.

His three great voyages, which have been translated into all languages, are well known to every one.

Coqueb.—Coquebert (Antoine Jean), a naturalist established at Rheims.

"Illustratio Iconographica Insectorum quæ in Museis Parisinis observavit J. Chr. Fabricius," 3 decades, 4to, Paris, 1799—1804.

He has also published various notes in the Bulletin des Sciences.

COUCH (Jonathan), an English naturalist.

I quote his paper "On the Fishes of Cornwall." Linn. Trans., XIV.

CRAM.—CRAMER (Peter), a merchant of Amsterdam.

"Papillons Exotiques des trois parties du Monde, l'Asie, l'Afrique et l'Amérique," in Dutch and French, 4 vols, 4to, containing four hundred coloured plates. Amsterdam, 1779—1782.

For the Supplement, see Stoll.

CREUTZ.—CREUTZER (Christian).

"Entomologische Versuche," or Entomological Essays, 8vo, with coloured plates, Vienna, 1799.

CREVELT, a German naturalist.

Author of a Memoir on a Gecko, published among those of the Society of Naturalists of Berlin, 1809.

CURT.—CURTIS (John), an English naturalist and painter.

He has commenced a work illustrating the genera of Insects and plants peculiar to Great Britain. Their characters are figured with the greatest accuracy.

This work, which is published in numbers, already forms 8 vols 8vo.

The same author has also published in the Zoological Journal some interesting observations on the Elater noctilucus.

CUV.—CUVIER (George-Leopold-Chretien-Frederic-Dagobert), born at Montbeliard, 1769; perpetual Secretary to the Académie des Sciences, &c. &c. &c.

Of my own works, exclusive of my Memoirs contained in the Annales du Muséum, I quote the following:

Ménag. du Mus., or "Ménagerie du Muséum d'Histoire Naturelle," by Messrs Lacepède, Cuvier and Geoffroy, with plates coloured by Marechal, and engraved by Miger, 2 vols 8vo. Paris, 1804. There is another edition in folio.

Tab. Elem., or "Tableau Elémentaire de l'Histoire Naturelle des Animaux," 1 vol. 8vo. Paris, 1798.

Leç. d'Anat. Comp., or "Leçons d'Anatomie Comparée, recueillies et publiées par MM. Dumeril and Duvernoy," 5 vols 8vo. Paris, 1800, 1805.

Rech. sur les Oss. Foss., or Oss. Foss., or "Recherches sur les Ossements Fossiles des Quadrupèdes," 4 vols 4to. Paris, 1812. A second edition was published in 5 vols 4to, 1821—1823.

Mém. sur les Moll., or "Mémoires pour servir a l'Histoire des Mollusques," 1 vol. 4to. Paris, 1816.

CUV. ET VAL.—CUVIER AND VALENCIENNES.

"L'Histoire Naturelle des Poissons," a work which I am now publishing in conjunction with M. Valenciennes. There are now completed 5 vols 4to and 8vo. Paris and Strasburg.

FRED. CUV.—CUVIER (Frederick), Inspector General of the University of Paris, member of the Académie des Sciences, &c. &c., born at Montbéliard, 1773.

I quote his Mémoirs in the Annales du Muséum, and principally those which relate to the teeth of the Mammalia, published in 1 vol. 8vo. Paris, 1825. I also particularly cite his

"Histoire Naturelle des Mammifères," published in conjunction with M. Geoffroy Saint-Hilaire in folio and 4to, with illustrations drawn from nature.

Cyrill.—Cyrillus or **Cirillo** (Dominico), a physician at Naples, publicly executed in 1796.

"Entomologiæ Neapolitanæ Specimen," 1 vol. folio, with coloured plates. Naples, 1787.

Dahl (George).

"Coleoptera and Lepidoptera," 1 vol. 8vo. Vienna, 1823.

Daldorf, a Danish officer.

Author of Memoirs on certain Fishes published in the Linnean Transactions and in the Journal of Gottingen.

Dalm.—Dalman (John William), lately deceased at Stockholm, where he was director of the Museum.

"Analecta Entomologica," 1 vol. 4to, with plates. Holmiæ, 1823.

"Prodromus Monographiæ Castniæ," 1 vol. 4to, with one plate. Holmiæ, 1825.

"Om Nagra Svenska Arter of Coccus," Memoir, 4to, with plates. Stockholm, 1826.

"A Monograph of the Chalcidites, or of the Insects of his family of the Pteromalini," 1 vol. 8vo. Stockholm, 1820.

"A Synopsis of the Lepidoptera of Sweden," published in the Memoirs of the Academy of Stockholm, 1816.

"Ephemerides Entomologicæ," 1 vol. 8vo. Holmiæ, 1824.

"A Memoir on certain Ichneumonides," 1 vol. 8vo. Stockholm, 1826.

A second, in the Swedish language, on the Insects enclosed in Copal, 1 vol. 8vo. Stockholm, 1826.

Dal.—Dalyell (J. Graham), a Scotch naturalist.

"Observations on Various Interesting Phenomena of the Planaria," 8vo. Edinburgh, 1814.

Dampier (William), the celebrated English mariner, born 1652.

"Voyage round the World," 2 vols 8vo. London, 1697 and 1699. It has been translated into French and undergone several editions. It contains some interesting traits of the history of animals.

Daniels (Samuel), an English painter.

"African Scenery," 1 vol. folio, a magnificent work which contains several beautiful figures of extremely rare animals.

Daub.—Daubenton (Louis-Jean-Marie), born at Montbard 1716, died at Paris 1800. He was a Professor of the Museum and of the Collége de France, and member of the Institute.

I quote the descriptions of the animals with which he has enriched the Natural History of Buffon.

Daud.—Daudin (François-Marie), died at Paris in 1804.

"Traité Elémentaire et Complet d'Ornithologie," of which but 2 vols 4to, Paris, 1800, have yet appeared; they only contain the Birds of Prey, and a part of the Passerinæ. It is an indifferent compilation.

"Histoire Naturelle des Reptiles," 8 vols 8vo. Paris, 1802 and 1803, a sequel to the Buffon of Sonnini.

"Histoire Naturelle des Rainettes, des Grenouilles et des Crapauds," 1 vol. 8vo, with numerous and coloured plates. Paris, 1803.

Dej.—Dejean (Comte), peer of France, lieutenant-general, &c.

"Catalogue de la Collection des Coléoptères de M. le Comte Dejean," 1 vol. 8vo, 1821.

"Species General des Coléoptères," 3 vols 8vo, 1825—1829. The fourth volume has lately been published.

"Histoire Naturelle et Iconographie des Coléoptères d'Europe," by MM. Latreille and Count Dejean, 3 nos 8vo, 1822.

See **Boisduval.**

Juss.—De Jussieu (Antoine de), Professor of Botany to the Jardin du Roi; born at Lyon 1686, died 1758.

I quote some of his Memoirs on Zoology published among those of the Academie des Sciences.

Dekay (James E), an American physician and naturalist.

Author of several Memoirs in the Annals of the Lyceum of New York.

Delap. et Brul.—Delaporte et Brulle.

"Notice sur un Nouveau Genre de la Famille des Charansons," published in the fourth volume of the Mémoires de la Société d'Histoire Naturelle de Paris.

Delle Chiaje (Stefano), Professor at Naples.

"Memoirs on the History of the Invertebrate Animals of the Kingdom of Naples," 2 vols 4to. Naples, 1823, 1825.

Deluo (John Andrew), a naturalist of Geneva, &c.

I have only quoted this celebrated geologist in relation to his Memoir "Sur les pierres judaiques," published in the Mémoirs des Savants etrangers."

Deshayes (G. P.), a naturalist of Paris.

"Anatomie et Monographie du genre Dentale," in the "Description des Coquilles Fossiles des Environs de Paris," 4to. Paris, 1824, 1825.

Desm.—Desmarets (Anselme Gaetan); corresponding member of the Académie des Sciences, and Professor of Zoology to the Ecole Veterinaire of Alfort.

"Histoire Naturelle des Tangaras, des Manakins, et des Todiers," 1 vol. folio. Paris, 1805.

"Traite de Mammalogie," serving as an explanation to the plates of the Mammalia of the Encyclopedie Methodique, 1 vol. 4to. Paris, 1820.

He is also the author of various articles in the "Dictionnaire d'Histoire Naturelle;" of which we will particularly designate that on the Malacostraca.

"Considerations generales sur la Classe des Crustaces," 1 vol. 8vo with plates. Paris, 1808.

"Histoire Naturelle des Crustaces Fossiles," published by him and M. Brongniart.

Desmoulins (Charles), vice-president of the Societé Linnéenne de Bourdeaux.

"Essai sur les Spherulites." Bourdeaux, 1826.

Diq. or **Diquem.**—**Dioquemare** (the abbé Jacques François), a naturalist of Havre, born 1733, died 1789.

An indefatigable observer, and author of various memoirs on the Zoophyta and Mollusca in the Philosophical Transactions, Journal de Physique, &c. &c.

Donati (Vitale), a physician at Padua, and traveller to the king of Sardinia, born 1713, and shipwrecked on his return from Egypt in 1763.

"Natural History of the Adriatic Sea," published in Italian, 1 vol. 4to. Venice, 1750. The French translation, La Haye, 1758. An imperfect and superficial work.

Donov.—**Donovan** (Edward), an English painter.

"The Natural History of British Fishes," 5 vols 8vo. London, 1820.

"The Natural History of British Insects," 8vo.

"An Epitome of the Natural History of the Insects of China," 1 vol. 4to. London, 1778.

"An Epitome of the Natural History of the Insects of India," 4to. London, 1800. I have seen but twelve numbers.

"General Illustration of Entomology," Part I. "An Epitome of the Insects of Asia," 1 vol. 4to. London, 1805.

Dorthes (Jacques Antoine), a physician at Montpellier, born 1759, died 1794.

"Memoire sur les Arraignées Maçonnes," published in the second volume of the Transactions Linneennes.

Drap. or **Draparn.**—**Draparnaud** (Jacques-Philippe-Raimond), Professor at Montpellier, born 1772, died 1804.

"Tableau des Mollusques Terrestres et Fluviatiles de la France," pamphlet 8vo. Montpellier and Paris, 1801.

"Histoire Naturelle des Mollusques Terrestres et Fluviatiles de la France," 4to, with fine engravings. Paris, 1805.

Drap.—Drapiez, Professor of Chemistry at Brussels.

Memoirs on a new genus of tetramerous Coleopters, and a description of new species of Mammalia, Birds, and Insects, published in the Annales Generales des Sciences Physiques.

Drur.—Drury, an English goldsmith, lately deceased.

"Illustrations of Natural History," 3 vols 4to, with finely coloured plates representing the rarer insects of his cabinet. London, 1770—1782.

Duf.—Dufour (Leon), a physician at Saint-Sever, Landes.

"Memoire Anatomique sur une nouvelle espece d'Insecte du genre Brachine," in the 18th volume of the Annales du Muséum d'Histoire Naturelle.

"Various memoirs "Sur l'Anatomie des Coleoptères, des Cigales, des Cicadelles, des Labidoures," on a new species of Ornithomyiæ, and on the genus Ocyptera, published in the Annales des Sciences Naturelles. Two Memoirs inserted in the Journal de Physique, one on the Anatomy of the Scorpions and the other on that of the Scolia. The Annales Generales des Sciences Physiques contain several others, in which he gives a description of various Arachnides and of several new species of Coleoptera, together with the anatomy of the Ranatra linearis, and of the Nepa cinerea.

Dufts.—Duftschmid (Gaspard), Professor at Lintz.

"Fauna Austriæ," 8vo, in German.

I have only seen the two first volumes, one of which appeared in 1805, and the other 1812. Lintz and Leipsic.

Dugez (Antoine) Professor at Montpellier.

"Recherches sur la Circulation, la Respiration et la Reproduction des Annelides à branches," 1828.

"Espèces Indigènes du genre Lacerta," Annales des Sc. Nat. XVI, 1828.

Duham.—Duhamel du Monceau, naturalist, agriculturist, &c., member of the Académie des Sciences, born at Paris 1700, died 1782.

"Traité general des Pêches," folio, Paris, 1769. I quote this work on account of the number of good plates of fishes which it presents.

Dum. or Dumer.—Dumeril (Constant), Professor to the Faculté de Medicine, and to the Jardin du Roi, member of the Académie des Sciences, born at Amiens, 1774.

Editor of the two first volumes of my "Leçons d'Anatomie Comparee."

"Zoologie Analytique," 1 vol. 8vo, Paris, 1806.

"Traité Elementaire d'Histoire Naturelle," 2 vols 8vo, second edition. Paris, 1807. Fourth edition, Paris, 1830.

Various Memoirs on Comparative Anatomy, among which is one on the "Poissons Cyclostomes," &c.

"Considerations Generales sur la Classe des Insectes," 1 vol. 8vo, with plates.

Also the articles in the Dictionnaire des Sciences Naturelles relative to Insects.

Duponch.—Duponchel (A. J), continuer of Godart's Natural History of the Lepidoptera of France.

"Monographie du Genre Erotyle," 4to, with plates, printed in the twelfth volume of the Memoires du Museum d'Histoire Naturelle.

He has continued, from the sixth volume inclusively, the work of the late M. Godart, entitled "Histoire Naturelle des Lepidopteres de France." The seventh is nearly completed. He has described a new genus of Coleopterous Insects, which he calls Adelostoma, and has published observations on the metamorphosis of the Nymphale Petit Sylvain.

Duport (Andrew Peter), fellow of the Royal Society of London.

Author of a Memoir on the Glaucus, in the fifty-third volume of the Philosophical Transactions.

Dutertre (Jean-Baptiste), a Dominican friar, missionary to the Antilles, born 1610.

"Histoire Generale des Antilles habitees par les Français, 4 vols 4to. Paris, 1666, 1671.

The second volume, or that relative to Natural History, contains some good observations. There is an edition in 1 vol. 1654.

Dutrochet (N.), physician at Chateau-Renaud.

An accurate and ingenious observer, author of certain memoirs in the Annales du Museum, &c.

Duv.—Duvau (Augusta), member of the Societé d'Histoire Naturelle.

"Nouvelles Recherches sur l'Histoire Naturelle des Pucerons," a memoir read before the Academie des Sciences on the 26th of April 1825, and published in the Memoires du Museum d'Histoire Naturelle.

Edwards (George), an English painter, member and librarian of the Royal Society.

"Natural History of Rare Birds," 4 vols 4to.

"Gleanings of Natural History," 3 vols 4to.

These two works form but one single collection of three hundred and sixty-two plates.

Next to the Planches Enluminées, it is the richest in respect to Birds that we possess. It also contains animals of other classes. The figures are beautiful, the text indifferent.

Edw.—Edwards (Milne), in conjunction with M. Victor Audouin, has published

"Recherches Anatomiques et Physiologiques sur la Circulation dans les Crustacees." Annales des Sciences Naturelles, II.

"Recherches Anatomiques et Physiologiques sur le Systeme Nerveux des Crutaçes." Ann. des Sc. Nat., XIV.

"De la Respiration Aerienne des Crustaces et des modifications que l'appareil branchiale presente dans les Crabes Terrestres." Ann. des Sc. Nat., XV.

"Memoire sur le Nicothoe," a singular animal that sucks the blood of the Lobster. Ibid. IX.

"Resumé des Recherches sur les Animaux sans vertebre faites aux Isles Chausay."

"Description des Annelides des Côtes de la France."

Edwards (Milne) alone.

"Description de quelques Crustaces nouveaux." Ann. des Sc. Nat., XIII.

"Recherches Zoologiques pour servir a l'Histoire Naturelle des Lezards." Ann. des Sc. Nat., XVI.

"Monographie des Crustaces Amphipodes.

Egede (John), a Dane, Missionary to Greenland, born 1686, died 1763.

"Description of Greenland," 1 vol. 8vo. Copenhagen and Geneva, 1763.

Eisenh.—Eisenhardt (Charles William), author of

"A Memoir on the Medusæ," in those of the Academia Naturæ Curiosorum of Bonn; and with additions by Chamisso, of a Memoir on certain animals of the class of Worms, Ibid., X, part II.

Ellis (John), a London merchant.

"Essay towards a Natural History of the Corallines found on the Coast of Great Britain and Ireland," 4to, London, 1755. Translated into French, and published at the Hague, 1756.

"The Natural History of many curious and uncommon Zoophytes," 1 vol. 4to, London, 1786. This work was published by him and Solander.

Engram.—Engramelle (Marie-Dominique-Joseph), an Augustine friar at Paris, born in 1727, died in 1780.

"Papillons d'Europe peints par Ernest et decrits par le reverend père Engramelle," 6 vols small folio, consisting of three hundred and forty-two coloured plates. The work finishes with the Noctua inclusively.

Ernest was an artisan of Strasburg who had a great and self-acquired talent for painting lepidopterous Insects.

Erxl.—Erxleben (John Christian Polycarpe), Professor of Natural History at Gottingen, born 1744, died 1777.

"Systema Regni Animalis, Classis I, Animalia, 1 vol. 8vo. Leipsic, 1777.

Esp.—Esper (E. T. C.), Professor at Erlang.

"Europæische Schmetterlinge," or Lepidoptera of Europe, 4 vols 4to, the first and the fourth divided into two, with coloured plates.

This work is not completed, but some additional numbers on the true Phalenites or the Geometræ, have been published.

"Die Pflanzenthiere," &c., his work on Zoophytes, 4 vols 4to. Nuremb., 1791, et seq.

Euphrasen (B. A.), a Swedish naturalist.

Author of a Voyage to St Bartholomew, and quoted for a Memoir inserted among those of the Academy of Stockholm.

EVERSH.—EVERSHAM.

Author of the Zoological Appendix to the "Travels in Bucharia," of the Baron de Mayendorf, with notes by M. Lichtenstein. It has been translated into French by M. Amédée Jaubert, 8vo, Paris, 1826.

FAB.—FABRICIUS (J. C.), a pupil of Linnæus, Professor of Natural History and Rural Economy at Kiel, born at Tundern, in the Duchy of Sleswick in 1742, died 1807. He published a great many works on Entomology, of which I have particularly quoted the following.

"Entomologia Systematica emendata et aucta," 4 vols 8vo, the first and third in two parts. Hafniæ, 1792—1794. This work contains several of his anterior ones, revised and modelled, such as the "Systema Entomologiæ," 1 vol. 8vo; "Species Insectorum," 2 vols 8vo; "Mantissa Insectorum," 2 vols 8vo.

"Supplementum Entomologiæ Systematicæ," 1 vol. 8vo. Hafniæ, 1798.

"Systema Eleutheratorum," 2 vols 8vo. Kiliæ, 1801.

"Systema Rhyngotorum," 1 vol. 8vo. Brunsvigæ, 1801.

"Systema Piezatorum," 1 vol. 8vo. Brunsvigæ, 1804.

"Systema Antliatorum," 1 vol, 8vo. Brunsvigæ, 1805.

He was about to publish his "Systema Glossatorum," when the hand of death was laid upon him. An extract from that work is given by Illiger in his Magazin für Insectenkunde.

FAB. or FABR.—FABRICIUS (Otho), a pastor in Greenland, and subsequently in Norway and Denmark.

"Fauna Groënlandica," &c. 1 vol. 8vo, Copenhagen and Leipsic, 1790, a work of great value on account of the exactness of the descriptions, but in which names are frequently improperly applied.

He also published certain memoirs among those of the Society of Natural History of Copenhagen.

FALCK (J. P.), a Swede, Professor of Botany at Petersburgh, born 1727; travelled in the service of the Russian government from 1768 to 1773, and committed suicide at Cassan in 1774.

His travels were published in German, 3 vols 4to, Petersburg, 1785, 1786. The two last relate entirely to Natural History.

FALL.—FALLEN (Charles Fredcrick), Professor of Natural History at Lund.

"Diptera Sueciæ," 4to, first volume. Lundæ, 1814—1817.

FARIN.—FARINES, a naturalist residing in the department of the Pyrenees Orientales.

Author of Observations on the larva of the Ripiphorus bimaculatus, in the Annales des Sciences Naturelles, 1826.

FAVANNE.

Author of a "Dictionnaire de Conchyliologie," and of a greatly enlarged edition of the Conchyliology of d'Argenville.

Fauj.—Faujas de Saint-Fond (B.), Professor of Geology at the Museum d'Histoire Naturelle.

"Histoire Naturelle de la Montaigne de St Pierre de Maestricht," 1 vol. 4to. Paris, 1799.

Fermin (Philip), physician at Surinam.

"Histoire Naturelle de la Hollande equinoxiale," 1 vol. 8vo. Amsterdam, 1765.

"Description de Surinam," 2 vols, 8vo. Amsterdam, 1769.

Two indifferent works filled with errors of nomenclature.

Fern. or Hern.—Hernandez (Francisco), physician-in-chief at Mexico, under Philip II.

"Nova Plantarum, Animalium et Mineralium Mexicanorum Historia," folio, Rome, 1651. A singular combination of fragments of the author, figures drawn by others, and annotations of editors. It should be read cautiously.

Feruss.—Ferussac (J. Daudebart de), a French naturalist.

Author of a new and enlarged edition of an "Essai d'une Methode Conchyliologique," originally written by M. de Ferussac, Sen., pamphlet, 8vo, Paris, 1807.

"Histoire des Mollusques Terrestres et Fluviatiles," folio, with fine plates. It is not yet completed.

He is also the principal editor of that important periodical called the "Bulletin Universel des Sciences," &c.

Feuill.—Feuillee (Louis), a Minim, the companion and plagiarist of Plumier, born 1660, died 1732.

"Journal d'Observations faites sur les Côtes Orientales de l'Amerique;" 2 vols, 4to. Paris, 1714.

Journal, &c., in New Spain and the islands of America, 1 vol, 4to. Paris, 1725.

Fitch. and Moll.—Fitchtel (Leopold de), a naturalist of Vienna, who in conjunction with J. P. C. **De Moll**, member of the Academy of Munich, published the

"Testacea Microscopica, aliaque minuta ex generibus Argonauta et Nautilus," cum tab. XXIV. Vienna, 1803.

Fisch.—Fischer de Waldheim (Gotthelf), a German naturalist, Director of the Imperial Museum at Moscow. Of his numerous works, we quote the following:

"Fragments of Natural History," in German, 1 vol. 4to. Franckfort, 1801.

"Anatomy of the Makis," in German. Franckfort, 1804.

"Description of certain Insects," published in the Memoirs of the Naturalists of Moscow, 1 vol, 4to. Moscow, 1806.

"Entomographia Imperii Russici," 2 vols 4to, with splendid engravings. Moscow, 1820—1822.

"Observations on a carnivorous Fly called Medeterus," 4to, with plates. Moscow, 1819.

"Memoir on the Argas of Persia," 4to, with a plate. Moscow, 1823.

"Letter on the Physodactylus, a new genus of Coleopterous Insects," 8vo. Moscow, 1824.

Fitzing.—Fitzinger, a physician and naturalist at Vienna.

"A New Classification of Reptiles according to their national affinities," 4to, in German. Vienna, 1826.

Fleming (John), a Scotch pastor.

"Philosophy of Zoology," 2 vols 8vo, Edinburgh, 1822.

Fleuriau de Bellevue, a naturalist at Rochelle.

Author of Memoirs on the Testacea and other Mollusca, published in the Bulletin des Sciences, Journal de Physique, &c.

Forsk.—Forskahl (Peter), a Swedish naturalist, born 1734, a pupil of Linnæus, and the companion of Niebuhr in his travels to the East, died during the journey in 1763.

"Descriptiones Animalium," &c., quæ in Itinere Orientali observavit," 4to. Copenhagen, 1775.

"Icones Rerum Naturalium quas in Itinere Orientali depingi curavit," 4to. Copenhagen, 1776.

Posthumous works, and extremely precious on account of the new species described in them, although the nomenclature is incorrect.

Fortis (J. B. or Alberto), an Italian naturalist, born at Venice 1740, died a bookseller at Bologna 1803. I quote his

"Memoires pour servir à l'Histoire Naturelle et principalement à l'Orictographie de l'Italie," 2 vols 8vo. Paris, 1802.

Forst.—Forster (John Reinhold), born at Dirchaw in Polish Prussia 1729, naturalist in the English service for the second voyage of Cook, and subsequently Professor at Halle. He died in 1798.

"Zoologiæ Indicæ Rarioris Spicilegium," 4to. London, 1790.

"Enchiridion Historiæ Naturali inserviens," 8vo. Halle, 1788.

I also quote him for the articles inserted by Bloch in his posthumous System of Fishes.

Fourcroy (Antoine François de), the celebrated Professor of Chemistry, Counsellor of State, and member of the Académie des Sciences; born 1755, died 1809. The only work we have had occasion to quote is his

"Entomologia Parisiensis," 2 vols 8vo, Paris, 1785, a small work of his youth, and a mere abridgement of that of Geoffroy.

Fred. Cuv. See **Cuv.**

Freminv.—Freminville (Baron de), an officer of the French navy; an able naturalist.

Author of various articles in the Dictionnaire Classique d'Histoire Naturelle.

Fries (B. F).

"Monographia Tanyporum Sueciæ," Lundiæ, 1823.

Fr.—Frisch (J. L.), Rector of the Gymnasium of Berlin, born 1666, died 1743.

"A Representation of certain German and foreign Birds" (in German), 2 vols folio, Berlin, 1739—1763, containing two hundred and fifty-five extremely exact but not fine plates.

"Beschreibung von Insecten in Teuschland," or a Description of the Insects in Germany, 1 vol. 4to. Berlin, 1730.

Froel.—Froelich (J. A), a German naturalist and physician of Elwangen.

Author of two Memoirs on the Intestinal Worms in the Naturforscher.

Gært.—Gærtner (Joseph), a celebrated botanist of Wirtemberg, born 1732, died 1791.

Author of the Carpologia, and also Zoological observations inserted in the Philosophical Transactions, and in the Miscellanea Zoologica of Pallas.

Gaillardot, a physician at Luneville, and an able naturalist.

Author of Memoirs on Fossils published in the Annales des Sciences Naturelles, &c.

Garden (Alexander), a Scotchman, physician at Charleston, South Carolina, born 1730, died 1771.

He transmitted various observations to Linnæus.

Gaza (Theodore de), a Greek who sought an asylum in Italy in the sixteenth century. He translated into Latin the work of Aristotle upon Animals.

Geb.—Gebler (F). a Russian naturalist and physician.

"Observationes Entomologicæ," a Memoir in 4to.

Deg.—Geer (Charles, Baron de), Marshal of the court of the Queen of Sweden, and member of the Academy of Stockholm, born 1720, died 1778.

"Memoires pour servir a l'Histoire des Insectes," 7 vols 4to, with plates. Stockholm, 1752—1778. An excellent work, that forms a sequel to that of Reaumur. The two first volumes are rare. Retzius has given an abridgement of this work in Latin entitled:

"Genera et Species Insectorum," 1 vol. 4to. Lipsiæ, 1783.

There is also a German translation of it, enlarged by Goez.

Geoff.—Geoffroy, a celebrated physician of Paris.

"Histoire abregée des Insectes," 2 vols 8vo, with plates. Paris, 1764.

This very elementary work has been republished, and augmented by Species added to it by Fourcroy in his abridgement of the same. See Fourcroy.

"Traité sommaire des Coquilles tant Fluviatiles que Terrestres, qui se trouvent aux environs de Paris," 1 vol. 12mo. Paris, 1767.

A small work, but remarkable for the attempt to class shells according to their animal.

Geoff.—**Geoffroy Saint-Hilaire** (Etienne), Professor of the Museum d'Histoire Naturelle, and member of the Academie des Sciences, born at Etampes 1773.

I quote his numerous Memoirs published in the Magasin Encyclopedique, the Annales du Museum, and in the great work on Egypt.

Various Memoirs on the organization of the Crustacea and Insects, published in different periodicals, such as the Journal Complementaire des Sciences Medicales, Memoires du Museum d'Histoire Naturelle, &c., and his

"Philosophie Anatomique," 2 vols. Paris, 1818 and 1822.

Isid. Geoff.—**Geoffroy Saint-Hilaire** (Isidore), son of the preceding, assistant naturalist of the Museum.

Author of various memoirs among those of the Museum d'Histoire Naturelle, and the Annales des Sciences Naturelles; also of the description of the Fishes of Egypt in the great work on that country.

Geor.—**Georgi** (J. T.), a German naturalist, who travelled in the service of the Russian government in 1772, 1773 and 1774.

His travels are printed in German, 2 vols 4to. Petersburg, 1775.

Germar (Ernest Frederick), a German naturalist.

"Dissertatio sistens Bombycum Species," &c., 4to. Halle.

He continues the "Magazin fur Insectenkunde" of Illiger.

Gm.—**Germar** (E. Francis), Professor of Mineralogy at Halle.

"Magazin der Entomologie," 4 vols 8vo. Halle, 1818—1821.

"Insectorum Species Novæ," first vol. 8vo, with plates. Halle, 1824. See Ahrens.

Gesn.—**Gesner** (Conrad), a physician at Zurich, born 1516, died 1565.

I quote his "History of Animals," 3 vols folio, to which has been added a Treatise on Serpents, and one on the Scorpion. This work, which is arranged alphabetically, is an excellent compilation of all the knowledge of the ancients, and is enriched with useful observations and numerous wood cuts, most of them good.

Gilliams, an American naturalist.

Author of certain Memoirs on Reptiles and Fishes, published in the Journal of the Academy of Natural Sciences of Philadelphia.

Gioeni (Giuseppe), a Sicilian naturalist of the house of Angio.

"Description of a new family and of a new genus of the Testacea," &c., in Italian, pamphlet 8vo. Naples, 1788.

It is the stomach of the Bulla lignaria which he has thus converted into an animal.

Giorna (M. P.), a Piedmontese naturalist, professor at Turin, born 1741, died 1809.

I quote some of his Memoirs published among those of the Academy of Turin.

Gmelin (Samuel Theophilus), born at Tubingen 1743, a German naturalist and traveller in the service of Russia, from 1768 to 1774, at which period he died in Persia.

His travels were published in German, 4 vols 4to. Petersburg, 1770—1784. They abound in valuable articles on Natural History.

Gm.—Gmelin (John Frederic), Professor of Chemistry at Gottingen, born at Tubingen in 1748, died in 18 .

The author of the thirteenth and last edition of the "Systema Naturæ" of Linnæus. His work, notwithstanding the ignorance of things, want of judgment and crudity that it exhibits, is still necessary, as being the only tolerably complete account of what had been done down to 1790.

Godart (J. B.), Chief of the Lyceum of Bonn under the Imperial Regime, died 1825.

Editor of the article "Papillon" of the Encyclopédie Methodique.

"Histoire Naturelle des Lepidoptères or Papillons de France, 5 (first) vols 8vo, Commenced in 1822.

Goetz. or rather **Goez.—Gozze** (I. A. E.), pastor of Quedlimbourg, one of the principal writers on the Intestinal Worms, born 1731, died 1793.

"Natural History of Intestinal Worms" (in German), 1 vol. 4to. Brackenberg, 1782.

Goldfuss (G. A.), Professor at Bonn.

"A Manual of Zoology," 2 vols 8vo. Nuremberg, 1820.

Author of various memoirs published among those of the Academia Naturæ Curiosorum.

Goran (Antoine), Professor at Montpellier.

"Historia Piscium," 1 vol. 4to. Strasburg, 1770.

Of the numerous works published by this learned naturalist, the above is the only one we have had occasion to quote. Strictly speaking, it is a mere description of genera, but drawn up in detail and in technical terms, in the manner of Linnæus. It is preceded by a sort of Icthyological Philosophy.

Grav.—Gravenhorst (J. L. C.), member of the Physical Society of Gottingen, &c.

"Coleoptera Microptera Brunsvicensia," &c., 1 vol. 8vo. Brunsvigæ, 1802.

"Monographia Coleopterorum Micropterorum," 1 vol. 8vo. Gottingæ, 1806.

"Nosography of the genus Ichneumon," 1 vol. (the first) 8vo. with plates, 1814.

"Monographia Ichneumonum Pedemontanæ Regionis," forming part of the twenty-fourth volume of the Memoirs of the Academy of Sciences of Turin.

"A Monograph of apterous Ichneumons," 1 vol. 8vo, with plates.

The description of a new genus, Helwigia, of the same tribe, an extract of which has been published in the Bulletin Universel of Baron de Ferussac.

"Conspectus Generum et Familiarum Ichneumonidum, auctoribus J. L. C. Gravenhorst et C. G. Neg. ab Esenbeck," 4to.

Gray (J. E.), an English naturalist attached to the British Museum.

Author of Memoirs on Reptiles in the Annals of Philosophy, 1825, and the Philosophical Magazine, 1827.

Grew (Nehemiah), celebrated for his discoveries in his "Vegetable Physiology," Secretary of the Royal Society of London, died 1711. I sometimes quote his

"Museum Regalis Societatis," folio. London, 1681.

Gronov.—Gronovius (John Frederick).

Author of various Memoirs on Fishes, published among those of various learned bodies, the Philosophical Transactions in particular.

Gronov.—Gronovius (L. Theodore), a municipal officer of Leyden, nephew of the preceding, born 1730, died 1777.

"Museum Ichthyologicum," 1 vol. folio. Leyden, 1754.

"Zoophylacium Gronovianum," 1 vol. folio. Leyden, 1765—1787.

Gendler (G. A.), painter and engraver at Halle.

Quoted for a Memoir in the Naturforscher.

Gualt.—Gualtieri (N.), physician at Florence, previously a Professor at Pisa.

"Index Testarum Conchyliorum quæ adservantur in Museo R." Gualteri, folio. Florence, 1742.

The figures are numerous and exact.

Guer.—Guerin (F. E.), member of the Societé d'Histoire Naturelle.

A Memoir on a dipterous Insect of the genus Boletophila published in the tenth volume of the Annales des Sciences Naturelles.

A second on the Eurypode, a new genus of the Crustacea, in the sixteenth volume of the Memoires du Museum d'Histoire Naturelle.

A third on a new genus, Themisto, of the same class, in the fourth volume of the Mem. d'Hist. Nat.

"Iconographie du Regne Animal," 4to, 1829. Ten numbers have already been published.

He edited many of the articles relative to Insects in the Encyclopedie Methodique, and gave the explanations of the plates, relative to those animals, of the same work.

Guldenst.—Guldenstedt (J. A.), of Riga, born 1745, and died at St Petersburgh in 1781; traveller in the service of Russia from 1768 to 1775.

His travels were published in German, 2 vols 4to. Petersburgh, 1787—1791.

We also quote several of his Memoirs published among those of the Academy of Petersburgh.

Guild.—Lansdown Guilding.

"Natural History of the Lamia amputator." Linnæan Transactions, vol. XIII.

Gunner (J. E.), bishop of Drontheim in Norway, born 1781, died 1773.

We quote certain Memoirs published among those of the Society of Drontheim, and of the Society of Sciences of Copenhagen.

Gyllenh.—Gyllenhal (L.), a Swedish naturalist. We quote the fourth part of the first volume of his

"Insecta Suecica," 1 vol. 8vo. Lipsiæ, 1827.

Haan (William de), Curator of the Royal Museum of the Netherlands, at Leyden.

"Monographiæ Ammoniteorum et Goniatiteorum Specimen," 8vo. Leyden, 1825.

Hagenb.—Hagenbach (J. J.), one of the Curators of the Royal Museum of Leyden, died 1826.

"Mormolyce Novum Genus," 1 vol. 8vo, with a plate. Norembergæ, 1825.

Hamm.—Hammel (A. D.).

"Entomological Essays," No. 1—6, 8vo. Petersburg, 1821—1827.

"Observations on the Blatta germanica," 8vo. Petersburg, 1821.

Hammer (L. F.), Professor of Natural History at Strasburg, son-in-law of the late Hermann.

We quote his Memoir on the American Ostrich, published in the Annales du Museum.

Hardw.—Hardwicke (T.), an English general who resided in India.

I quote several of his papers from the Linnean Transactions.

Harlan (Richard), an American naturalist and physician, Professor of Comparative Anatomy at Philadelphia.

"Fauna Boreali Americana," 1 vol. 8vo, Philadelphia, 1825, a work which contains the history of the quadrupeds of this country.

He has also published various interesting Memoirs among those of the Lyceum of New York and of the Academy of Natural Sciences of Philadelphia.

Harris (G. P.), an English naturalist.

I quote his description of two new species of Didelphis, inserted in the Linnean Transactions, vol. IX.

Harr.—Harris (Moses), an English painter.

"An Exposition of English Insects," in French and English, 1 vol. 4to, with coloured plates. London, 1781.

Hart.—Hartmann, painter and engraver of subjects of Natural History at St Gall.

Author of a System of the terrestrial and fluviatile Testacea of Switzerland.

Hasselq.—Hasselquist (Frederick), a Swedish naturalist, one of the first pupils of Linnæus, born 1722, died 1752.

His Travels in the East were published by Linnæus in the Swedish language, with Latin descriptions of the animals and plants. Stockholm., 17 .

There is a French translation without the descriptions, 1 vol. 12mo. Paris, 1769.

Hasselt (J. C. Van), a young Hollander, physician, and naturalist, the friend and companion of Kuhl, whom he survived but a few months.

Hegetsch.—Hegetschweiler (J. J.), a naturalist of Switzerland.

"Dissertatio Inauguralis Zootomica de Insectorum Genitalibus," 1 vol. 4to, Turici, 1820.

Helw.—Helwigg (J. C. L.).

"Fauna Etrusca, &c., Petrii Rossii, iterum edita et annotatis perpetuis aucta," 1 vol. 8vo. Helmstadii, 1755. See Illiger.

Herbst (J. F. W.), a preacher at Berlin, born 1743.

"Natursystem aller Bekanten in und Auslændischen Insekten," &c., von Carl. Gustaf Jablousky forgesetz, von J. F. W. Herbst, 10 vols 8vo, with an atlas of coloured plates to each volume. Berlin, 1758, et seq. It is a treatise on the Coleoptera.

"Versuch einer Naturgeschichte der Kraben und Krebse," 3 vols 4to, with sixty-two coloured plates. Berlin, 1790—1808. A treatise on the Crustacea and a useful compilation containing several new figures.

"Natursystem der Ungeflugelten Insekten" (the genera Solpuga, Tarentula and Phalangium), 1 vol. 4to with coloured plates. Berlin, 1797.

"Natursystem der ungerflugelten Insekten (genus Scorpio), 1 vol. 8vo. Berlin, 1708.

"Archiv der Insecten Geschichte, Herausgegeben," von J. Casp. Fuesly, 1 vol. 4to, with coloured plates. Zurich and Wintertkar, 1791. This work has been translated into French.

He has also published a Monograph of the Linnæan genus Papilio, representing all the species, but as most of the figures are copies, I have not quoted it.

Herm.—Hermann (John), Professor at Strasbourg, a laborious and erudite naturalist, born 1738, died 1800.

"Tabula Affinitatum Animalium," 1 vol. 4to, Strasb., 1783.

"Observationes Zoologicæ Posthumæ, 1 vol. 4to. Strasb., and Paris, 1804.

Herm.—Hermann (J. F.), son of the preceding, born in 1768, died before his father, in 1793.

He has left an "Apterological Memoir," 1 vol. fol. Strasbourg, 1804.

Hoev.—Vander Hoeven (John), Professor at Leyden.

Author of a "Manual of Zoology," in Dutch, 2 vols 8vo, Delft. 1807; of a "Thesis de Sceleto Piscium," 8vo, Leyden, 1822; and of a Memoir on the Ornithorhynchus, &c.

Hofman.—Hofmansegg (Count), a learned naturalist of Saxony, and a zealous protector of the sciences.

Author of various Memoirs on the animals of Brazil and Portugal.

Holten, a Danish naturalist.

Quoted as author of a Memoir published in the fifth volume of the Soc. of Nat. Hist. of Copenhagen.

Home (Sir Everard), the celebrated surgeon, curator of the Hunter Museum, at London, and fellow of the Royal Society.

"Lectures on Comparative Anatomy," 6 vols 4to. London, 1814—1828.

I also quote several of his Memoirs published in the Philosophical Transactions.

Hopp.—Hoppe (D. H.), druggist at Ratisbonne.

"Enumeratio Insectorum Elytratorum Indigenorum," 1 vol. 4to, with coloured plates. Erlangæ, 1795. It is a useful work in studying the Donaciæ.

Horns.—Hornstedt, a Swede who travelled in Java.

Quoted for a Memoir, on the Acrochordus, published among those of Stockholm, 1787.

Horsf.—Horsfield (Dr Thomas), an American naturalist residing in London.

"Zoological Researches in Java and the neighbouring Islands," 4to, with excellent plates. London, 1825.

He has also published the first number of a "Descriptive Catalogue of the Lepidoptera in the Museum of the East India Company," 4to, London, 1828.

Houtt.—Houttuyn (Martin).

Author of certain Memoirs among those of the Academy of Haarlem; of a Dutch translation taken from the Systema of Linnæus, &c. He is also the continuer of Noseman's History of the Netherlands.

HUB.—**HUBER** (Francis), corresponding member of the Academy of Sciences of Geneva. Deprived of sight, but still a most perspicacious observer.

"Nouvelles Observations sur les Abeilles," 2 vols 8vo, with plates. Paris and Geneva, 1814. The second volume is from the pen of his son.

HUB.—**HUBER** (Peter), son of the preceding.

"Recherches sur les mœurs des Fourmis Indigènes," 1 vol. 8vo, with plates. Paris and Geneva, 1810.

"Observations sur les Bourdons," published in the sixth volume of the Transactions de la Societé Linnéenne.

HUBN.—**HUBNER** (J.), painter at Augsbourg.

His Iconographic work on the Lepidoptera of Europe is the most complete and perfect of the kind hitherto published. The text is in the German language. He is about to give us the Exotic Lepidoptera, of which several plates have already appeared; the whole number, in royal 8vo, will amount to near a thousand.

HUMB.—**HUMBOLDT** (Alexander de), member of the Académie des Sciences, of the Academy of Berlin, &c. &c., born 1769.

Of the works of this illustrious savant I chiefly quote the

"Observations de Zoologie et d'Anatomie Comparée," of which there are already published fourteen numbers, 4to. Paris, 1811—1827.

HUNTER (John), the celebrated Scotch surgeon who settled in London, born 1728, died 1793.

I quote his Treatise on the teeth, and various Memoirs inserted in the Philosophical Transactions.

HUZARD, Jun., who in conjunction with M. Pelletier published "Recherches sur le Genre Hirudo." Paris, 1825.

ILLIG.—**ILLIGER** (J. C. G.), Professor at Berlin; he died young.

"Prodromus Systematis Mammalium et Avium," 1 vol. 8vo. Berlin, 1811. A work remarkable for the precision which the author endeavours to give to the genera of these two classes, and for the elegance of its nomenclature.

"Verzeichniss der Kœfer Preussens," or a Catalogue of Prussian Insects, a work commenced by Theophilus Kugelann, and terminated by I. Illiger, I vol. 8vo. Hall., 1798.

"Magasin fur Insectenkunde, 7 vols 8vo. Brunswick, 1801—1807.

"Systematisches Verzeichniss von den Schmetterlingen der Wiener Gegend," 2 vols 8vo. Bruns., 1801. It is a new edition of the "Systematic Catalogue of the Lepidoptera of the Environs of Vienna."

He has also continued the "Fauna Etrusca" of Rossi, commenced by Helwigg, vol. ii, 8vo. Helmstadii, 1807.

Ittiol. Veron.—**Ittiolitologia Veronese.**

A great work on the Petrified Fishes of Mount Bolca, where, notwithstanding its magnificence, they are neither faithfully delineated nor well characterized.

Jacq.—**Jacquin** (N. J. de), a celebrated botanist and professor at Vienna, born at Leyden, 1727, died in 18—.

"Miscellanea Austriaca," 2 vols 4to. Vienna, 1778, 1781. It contains some observations relative to animals.

Jacq.—**Jacquin** (J. F. de), son of the preceding.

The author of "Materials for a History of Birds" (in German), 1 vol. 4to, which contains some figures of rare birds. Vienna, 1784.

Johns.—**Johnson** (J. Rawlins), an English naturalist.

"A Treatise on the Medicinal Leach," 8vo, London, 1816, and the second part, Ibid, 1825.

"Observations on the genus Planaria." Philosophical Transactions, 1822, and continued in 1825.

Jour. d'Hist. Nat.

By this title we designate a periodical work, of which only two volumes 8vo were published, and which were united under the name of "Choix de Mémoires sur divers objects d'Histoire Naturelle, par MM. Lamarck, Brugières, Olivier, Haüy et Pelletier. Paris, 1792.

Journ. de Phys.

Under this appellation I quote the "Observations sur la Physique, l'Histoire Naturelle et les Arts," of which 2 vols appeared annually, from 1778 to 1823: at first under the direction of the Abbé *Rozier*, then under that of *Lametherie*, physician and adjunct professor in the Collége de France, and finally under the superintendence of M. de Blainville.

Jurine (Louis), Professor of Anatomy and Surgery at Geneva.

"Nouvelle méthode de classer les Hyménoptères et les Diptères," with plates, Hymenop., vol. I, 4to. Geneva, 1807; a very superior work, and indispensable for the study of this order.

"Observations sur le Zenos vesparum," a memoir in 4to, with one plate, 1816.

"Observations sur les ailes des Hyménoptéres," a memoir, with plates, published in the twenty-fourth volume of the Memoirs of the Academy of Sciences of Turin.

"Histoire des Monocles," 1 vol. 4to. with plates. Geneva, 1820.

His second son, whose demise is to be regretted, has published in the seventh volume of the Annales du Muséum, &c., an excellent Memoir on the Argulus foliaceus. See Argulus.

Kæmpf.—**Kæmpfer** (Engilbert), a German physician who travelled in Persia, India and Japan, born at Lemgo, in the county of Lippe in 1651, died 1713.

"Amœnitatum Exoticarum," fascic. V, 4to. Lemgo, 1712.

"A Description of Japan" in German, translated into French under the title of "Histoire Naturelle, Civile et Ecclesiastique du Japan," 2 vols folio. La Haye, 1729.

Kaup, a German naturalist.

Author of the notes on Reptiles in the Isis of Oken.

Kirb.—Kirby (William), an English clergyman, member of the Linnean Society, rector of Barham, in the county of Suffolk, &c.

"Monographia Apum Angliæ," 2 vols 8vo, with plates. Ipswich, 1802.

He has published, in the ninth volume of the Transactions of the Linnean Society, a Monograph of the Apions of England, and in the eleventh, that of the Strepsiptera.

He has lately, in conjunction with M. Spence, published a new edition of the "Introduction to Entomology," 4 vols 8vo, with plates. London, 1828.

He has also written several Memoirs on various Insects, for the Linnean Transactions, and the Zoological Journal, most of which we have quoted.

Kleem.—Kleeman (C. F. C), a painter at Nuremberg, born 1735, died 1789.

"Beytræge zur Natur Oder Insecten-geschichte," 1 vol. 4to, Nüremberg, 1761.

A supplement to the work of Rœsel his father-in-law, forming the fifth volume.

Kl.—Klein (J. T.), Secretary of the Senate of Dantzick, a laborious author who has written on every branch of natural history, but without taste or genius; born in 1685, died 1759.

"Summa Dubiorum circa classes Quadrupedum et Amphibiorum Linnæi," 1743.
"Quadrupedum Dispositio et brevis Historia Naturalis," 1751.
"Historiæ Avium Prodromus," 1750.
"Stemmata Avium," 1759.
"Tentamen Herpetologiæ," 1755.
"Historiæ Naturalis Piscium promovendæ missus," V, 1740—1749.
"Mantissa Icthyologica," 1746.
"Methodus Ostracologica," 1753.
"Descriptiones Tubulorum Marinorum," 1737.
"Naturalis Dispositio Echinodermatum," 1734.

Klug.—Klug (Francis), physician at Berlin.

"Monographia Siricum Germaniæ, atque Generum illis Adnumeratorum, cum tabulis æneis coloratis VIII," 1 vol. 4to. Berlin, 1803.

Various Memoirs on different genera or species of Hymenoptera published among those of the Society of Naturalists of Berlin.

"A Critical Review of the Genera of Fabricius derived from that of Apis, Lin.," in the Magazin fur Insectenkunde of Illiger, 1807.

"Entomologische Monographien," 1 vol. 8vo, with plates. Berlin, 1824.

"Proscopia, Novum Genus Insectorum Orthopterorum," folio, with two plates.

"Entomologiæ Brasilianæ Specimen."

And several Monographs in the German language.

Knoch (A. G.).

"Neue Beytraege zur Insectenkunde," 1 vol. 8vo, with plates. Leipsic, 1801.

Knorr and **Walch**, on **Knorr**, &c., or **Walch Petrif.** of **Knorr.**

Knorr (George Wolgang), an engraver at Nuremberg, born 1705, deceased 1761, and

Walch (J. E. E.), Professor at Jena, jointly published a work called the

"Collection of the Monuments of the revolutions experienced by the terrestrial globe, containing petrifactions, &c., 4 vols. Nuremberg, 1775—1778.

I quote them in relation to certain Testacea and Lithophyta.

I also quote, under the title of **Knorr Vergn.**, or **Knorr Delic.**, a work of the same engraver, editions of which are to be found in various languages, styled in German Vergnügungen, &c.; Deliciæ, in Latin, and in French Amusements des yeux et de l'esprit, or Collection de Coquillages, &c., 6 vols 4to. Nuremb., 1760, 1773.

Kœhl.—Kœhlreuter (J. G.).

We quote several of his Memoirs inserted in the Nov. Comment., Acad. Petrop.

Krusenstern, a Russian admiral,

Whose voyage round the world contains several observations relative to Natural History by Tilesius.

Kuhl (Henry), a young naturalist of Hanau, born in 1797, who died at Batavia, where he was engaged in collecting for the Museum of the Netherlands, in company with a young Hollander named Van Hasselt. Their collections were immense, and included all the classes. Kuhl has left us in German

"Materials for Zoology and Comparative Anatomy, Monographs of the Paroquets, Petrels, Bats of Germany," &c.

Lac. or **Lacep.—Lacepede** (B. G. E. de la Ville Courte de), Professor of the Museum d'Hist. Nat., member of the Acad. des Sciences, &c., &c.; born at Agen.

I have frequently quoted his three principal works, which form a sequel to the great "Histoire Naturelle" of Buffon.

"Histoire Naturelle, Generale et Particulière des Quadrupèdes Ovipares et des Serpents," 2 vols 4to. Paris, 1798—1803.

"Histoire Naturelle, &c., des Poissons," 5 vols 4to. Paris, 1798—1803.

"Histoire Naturelle, &c., des Cetacés," 1 vol. 4to. Paris, 1804.

Also certain Memoirs in the Annales du Muséum.

Laet (Jean de), a geographer of Anvers in the seventeenth century.

"Novus Orbis, seu Descriptionis Indiæ Occidentalis," lib. XVIII, 1 vol. folio. Leyden, 1633.

Laich.—Laicharting (J. N. de), Professor at Inspruck, born 1757.

"Verzeichniss der Tyroler Insecten," with plates, 2 vols 8vo. Zurich, 1781—1784.

Lam.—Lamarck (Jean-Baptiste De Monnet, Chevalier de), Professor of the Muséum d'Hist. Nat., and member of the Acad. des Sciences, born at Basentin, in Picardie in 1743 died at Paris in December 1829.

Of the numerous works of this celebrated naturalist I have chiefly quoted the

"Système des Animaux sans vertèbres," 1 vol. 8vo. Paris, 1801.

"Extrait du Cours de Zoologie sur les Animaux sans vertèbres," 8vo. Paris, 1812.

"Histoire Naturelle des Animaux sans vertèbres," 7 vols 8vo. Paris, 1815—1822.

"Mémoires sur les Coquilles," published in the Annales du Muséum.

The author having become blind during the publication of this work was aided, in the Bivalves, by M. Valenciennes, and in the following classes, by Mademoiselle Lamarck, his eldest daughter.

Lamartinierе, a French naturalist, one of the unfortunate companions of La Peyrouse.

Quoted for a Memoir on some parasitical animals, published in the Journal de Physique for 1787, and at the end of the Voyage de la Peyrouse.

Lambert, an English naturalist.

Author of a Memoir on the Bos Frontalis, in the seventh volume of the Linnean Transactions.

Lamour.—Lamouroux (J. V. F.), a naturalist of Agen, Professor at Caen.

Quoted for certain Memoirs in the Annales du Muséum, and for a "Histoire des Polypiers," of which I saw a part in MS., at the time of my first edition. It was published in 1 vol. 8vo, 1817.

"Exposition Méthodique de l'ordre des Polypiers," with the plates of Ellis and Solander, and some new ones, 1 vol. 4to. Paris, 1821.

"Dictionnaire des Zoophytes," forming part of the Encyclopédie Méthodique, 4to. Paris, 1824.

Langsd.—Langsdorf, a German naturalist who accompanied admiral Krusenstern, and established himself at Brazil.

Author of certain Memoirs, and quoted as having given names to the various objects he discovered.

Lapeyr.—Lapeyrouse (Philippe Picot, Baron de), Professor of Natural History at Toulouse.

"Description de plusiers espèces d'Orthoceratites et d'Ostracites," 1 vol. folio, Nuremb., 1781.

I also quote certain articles written by him for the Dictionnaire des Oiseaux of the Encyclopédie Méthodique.

Laroche (De), a young physician of Paris, prematurely snatched from the sciences by death.

" Author of Memoirs in the Annales du Muséum, and of one in particular, Sur les Poissons d'Ivica, in the thirteenth volume of that collection.

LASP.—LASPEYRES (J. H.), a municipal officer of Berlin.

"Sesiæ Europeæ Iconibus et Descriptionibus, illustratæ, 1 vol. 4to, Berlin, 1801.

"Critical observations on the Systematic Catalogue of the Lepidoptera of the Environs of Vienna," inserted in the Magazin für Insecktengunde of Illiger, &c.

LATH.—LATHAM (John), Fellow of the Royal Society, born 1740.

This author has enriched the science of Ornithology, in particular, with new and beautiful species, but his works, which are not written with critical accuracy, should be read with caution.

"A General Synopsis of Birds," 3 vols 4to, and two Supplements. London, 1782, et seq.

"Index Ornithologicus," 2 vols 4to. London, 1790.

LAT.—LATREILLE (Pierre-André), Professor of the Muséum d'Histoire Naturelle, member of the Académie des Sciences, &c., born at Brives in 1762.

"Histoire Naturelle des Salamandres," 1 vol. 8vo, with plates. Paris, 1800.

"Histoire Naturelle des Reptiles," forming a sequel to Deterville's Buffon, 4
"Précis des Caractères Génériques des Insectes," 1 vol. 8vo. Brives, 1796.
vols 12mo, with plates.

"Genera Crustaceorum et Insectorum," 4 vols 8vo, with plates. Paris, 1806—1807.

"Histoire Naturelle des Crustacés et des Insectes," forming a sequel to Sonnini's edition of Buffon, 14 vols 8vo, with plates. Paris, 1802—1805.

"Histoire Naturelle des Fourmis," 1 vol. 8vo, with plates. Paris, 1802.

His Memoirs inserted in the Annales du Muséum, &c.

The entomological portion (partly written by him) of the Nouveau Dictionnaire d'Histoire Naturelle, and of the Encyclopèdie Méthodique, and the whole of the same part in the Observations de Zoologie et d'Anatomie Comparée, or the second part of the Travels of Messrs de Humboldt and Aimé Bonpland.

"Memoires de la Soc. d'Hist. Nat., de Paris, 4to.

"Esquisse d'une Distribution Generale du Règne Animal," 1 vol. 8vo. Paris, 1824.

"Familles Naturelles du Règne Animal," 1 vol. 8vo. Paris, 1825.

Various general Memoirs on Insects, published among those of Mus. d'Hist. Nat.

The description of the Insects collected by M. Caillaud in his travels in Nubia, which forms part of his Narrative.

The Entomological portion of the second edition of the Nouveau Dictionnaire d'Histoire Naturelle, and various articles of the Dictionnalre Classique d'Histoire Nâturelle, as well as those relative to the same subject, of the Encyclopédie Méthodique.

The description (Ann. der Sc. Gener.), of a new genus of Araneides.

LAUR., or LAURENT.—LAURENTINI (J. N.), a physician of Vienna.

"Specimen medicum exhibens Synopsis Reptilium emendatum," 1 vol. 8vo. Vienna, 1768.

This thesis is said to have been written by Winterl, since celebrated as a paradoxical chemist.

LEACH (W. E.), an English physician and naturalist, one of the Curators of the British Museum.

A Monograph of the genus Meloe, with plates, inserted in the Transactions of the Linnean Society.

"Malacostraca Pedophthalma Britaniæ," 4to, with fine coloured plates. London, 1815, 1816. Eight numbers have been published.

"A General Arrangement of the Classes Crustacea, Myriapoda and Arachnides, constituting part of the eleventh volume of the Transactions of the Linnean Society. An extract of this work is given in the Bulletin de la Societé Philomatique.

"On the Classification of the Natural Tribes of Insects, Notonectidea," published in the twelfth volume of the above mentioned Transactions.

"Description of some new genera and species of Animals discovered in Africa," by T. C. Bowdich, a half sheet in 4to.

"Zoological Miscellany," 3 vols 8vo. London, 1817.

"On the Genera and Species of Proboscideous Insects," 1 vol. 8vo, with plates. Edinb. 1817.

"Appendix, No. 10, to a general notice of the animals taken by M. John Cranch, during the expedition to explore the source of the river Zaire," 4to.

Various articles in the Dictionnaire des Sciences Naturelles, relative to the Crustacea, and Memoirs in the Linnean Transactions.

Le Cl.—Le Clerc, naturalist at Laval, author of

"Observations sur la corne du Psile de Bosc", presented to the Academie des Sciences, in 1815, and of other interesting observations.

Lec., or Le C.—Le Conte (Major John), an American naturalist, and officer in the service of the United States.

Author of various memoirs on Quadrupeds, Reptiles, &c., published in the Journal of the Academy of Natural Sciences of Philadelphia, and in the Annals of the New York Lyceum.

Lefebv.—Lefebvre (Alexander), a French naturalist,

Has published in the Annales de la Societé Linneenne, a description of several new Insects captured by him in Sicily, and that of three Lepidoptera.

Leguat (François), a protestant of Burgundy, who sought refuge in Holland.

"Voyages et Aventures de Fr. Leguat et de ses Compagnons," 2 vols 12mo. London, 1720. They contain good figures of various animals.

Leisler.

Author of a Supplement to Bechstein's Birds of Germany. Hanau, 1812, 1813.

Lepel.—Lepelletier de Saint Fargeau (Amedée), a naturalist of Paris. Author of

"Monographie des Chrysis des Environs de Paris," in the Ann. du Mus. d'Hist. Nat., No. 58.

"Mémoire sur les Araignées" in the Bulletin de la Societé Philomatique, April 1813, No. 67.

"Monographia Tenthredinetarum Synonymia Extricata," 1 vol. 8vo. Paris, 1823.

Jointly with M. de Serville, of the article on Insects in the tenth volume of the Encyclopédie Methodique.

He has communicated to the Académie des Sciences, Observations on the coition of different species of Volucella, a genus of Dipterous Insects.

LESKE (N. G.), Professor at Leipsick, and subsequently at Marburg, born 1752, died 1786.

"Museum Leskeanum, Regnum Animale," 1 vol. 8vo, with coloured plates. Lips. 1789.

I also quote him for his enlarged edition of "Klein's Treatise on the Echini," 1 vol. 4to. Lips., 1778.

LESS.—LESSON (R. P.), naturalist, jointly with M. Garnot, of Duperrey's Expedition in the Coquille.

These two naturalists have edited the Zoological part of the narrative of the above expedition; that part is not yet completed. M. Lesson is also the author of the

"Manuel de Mammalogie," 1 vol. 12mo. Paris, 1827.

"Manuel d'Ornithologie," 2 vols 12mo. Paris, 1820.

"Manuel de l'Histoire des Molusques et de leurs Coquilles, 2 vols 12mo. Paris, 1829. His

"Histoire des Oiseaux Mouches," with excellent plates, now being published.

LESUEUR (C. A.), a French naturalist, from Havre, residing in the United States.

One of the draughtsmen who accompanied Baudin and one of Péron's most efficient and zealous co-operators in Zoological researches. He has published some Zoological Observations in the Bulletin des Sciences, and the prospectus of a great work on the Medusæ, accompanied by specimens of several of the plates. He has also furnished various papers for the Journal of the Academy of Natural Sciences of Philadelphia, the Memoires du Mus. d'Hist. Nat., &c.,

LEUKARD (F. S.), author of

"Zoological Fragments," Helmstadt, 1819

The Mollusca of the Voyage of Ruppel.

LEW.—LEWINS (J. W.), author of the

"Natural History of the Lepidopterous Insects of New South Wales," with coloured plates, 1 vol. 4to. London, 1805.

"Natural History of the Birds of New Holland."

LICHT.—LICHTENSTEIN (A. A. H.), Professor of the Oriental Languages at Hamburg, born in 1765.

A dissertation on the genus Mantis of Linnæus, in the sixth volume of the Linnean Transactions.

LICHTENSTEIN (H.), Professor at Berlin.

"Voyage to the Cape of Good Hope," 2 vols 8vo. Berlin, 1811.

Various Memoirs on the Antilopes, the genus Dipus, the Animals of Marcgrave, &c. published among those of the Academy of Berlin.

Lindroth, a Swedish naturalist.

Author of a paper in the nineteenth volume of the New Stockholm Memoirs.

Link (J. H.), a physician at Leipzic, born in 1674, died in 1734.

" De Stellis Marinis, liber singularis," published by Christ., Gabr. Fischer, 1 vol. folio. Leipzic, 1733.

L. or **Lin.**—**Linnæus** or **Linne** (Charles de), Professor of Natural History at Upsal, and author of the great reform in the nomenclature of Natural History. He was born in 1707, and died in 1778. I quote his

" Systema Naturæ," particularly the tenth edition of 1757; the twelfth of 1766; and above all, the thirteenth edition, published by Gmelin, 7 vols, 8vo. Leipzic, 1788.

" Amœnitates Academicæ," a collection of theses, in 10 vols 8vo, 1749—1790.

" Museum Adolphi Frederici Regis," with thirty-three plates, 1 vol. folio. Stockholm, 1754.

The author himself, in his other works, quotes a second volume of this latter one; it is a small octavo.

" Musæum Ludovicæ Ulricæ Reginæ," 1 vol. 8vo. Stockholm, 1764.

" Fauna Suecica," 1 vol. 8vo, first edition, 1746; second, 1761; the third by Retzius, Leipzic, 1800, only containing the Vertebrata.

Lin. Trans. or **Trans. Lin. Soc.**, or **Lin. Soc.**

" Transactions of the Linnean Society of London," 18 vols 4to. London, 1791, et seq.

Lister (Martin), an English naturalist, and physician to Queen Anne, died 1711.

" Historia sive Synopsis Methodica Conchyliorum," with 1059 engravings, 1 vol. folio. London, 1689—1693.

There is another edition, with the synonymes of Linnæus, published by William Huddesford. London, 1770.

" Historia Animalium Angliæ, de Araneis, de Cochleis, tum Terrestribus tum Fluviatilibus, de Cochleis Marinis." London, 1678.

The part relating to the Spiders is also found in the " Historia Insectorum" of Ray.

Lyon.—**Lyonnet** (Peter), Interpreting Secretary to the United Provinces, born in 1707, died in 1789.

" Traité Anatomique de la Chenille du Saule," 4to, La Haye, 1762, with plates, engraved by the author, a work which is at once the masterpiece of engraving and anatomy.

Macl., or **Mac L.**—**Mac Leay** (W. S.), of the Linnæan Society of London.

" Horæ Entomologicæ," 8vo, vol. 1st, in two parts, with plates. London, 1819, 1821.

" Annulosa Javanica," 4to, with plates, No. I. London, 1825.

He has also published some general Memoirs on Insects, not referred to, however, in this work.

Maccar.—Maccari, (P.) member of the Societé de Medicine of Marseilles, &c.

"Memoir sur le Scorpion qui se trouve sur la Montaigne de Cette," &c. 1 vol. 8vo, 1810.

Macq.—Macquart, (J.), member of the Societé Royale des Sciences, d'Agriculture et des Arts of Lille.

A series of Memoirs on the "Insectes Dipteres du Nord de la France," with plates representing their wings, published among those of the above Society, which form 4 vols 8vo, with plates, Lille, 1826—1829.

Macri (Zaverio), a Neapolitan naturalist.

"New Observations on the Pulmo Marinus of the Ancients," in Italian, 1 vol. 8vo. Naples, 1778.

Mann.—Mannerheim (C. G.), counsellor to the Emperor of Russia.

"Eucnemis Insectorum genus," with two plates, 1 vol. 8vo. Petrop., 1823.

"Observations on the genus Megalopus," in the tenth volume of the Memoirs of the Imperial Academy of Sciences of St Petersburg, 1824.

"Description of forty new species of Scarabæides from Brazil," with plates, 4to.

Mantell (G.), member of the College of Surgeons of London resident at Lewes.

"Illustrations of the Geology of the County of Sussex," 2 vols 4to. London, 1822, 1827.

Marcgr.—Marcgrav de Liebstadt (George) of Meissen in Saxony, a traveller in Brazil; born 1610, died in Guinea, 1644.

"Historiæ Rerum Naturalium Brasiliæ," lib. 8, in fol. Leyden and Amsterdam, 1648. An excellent work for the times, full of exact descriptions and recognizable though rude figures of all kinds of animals.

Marsh.—Marsham, an English naturalist, Treasurer of the Linnean Society, &c.

"Entomologia Britannica, sistens Insecta Britanniæ Indigena, secundum methodum Linnæanum disposita," tom. I, Coleoptera. London, 1802.

"A Monograph of the genus Notoclea" (Paropsis, Olivier), with plates, published in the ninth volume of the Transactions of the Linnean Society.

Martens (Frederick), a surgeon at Hambourg.

"A Voyage to Spitzberg," in German, 1 vol. 4to, Hambourg, 1675.

It is useful with respect to the animals of the Arctic Ocean.

MARTENS (George de), Secretary of the Supreme Court of Wirtemberg.

"A Voyage to Venice," 2 vols 8vo. Ulm, 1824. It contains a Catalogue of the Fishes of that port.

MARTINI (F. H. G.), a physician of Berlin, born 1729, died 1778. He commenced the great conchyliological work entitled the

"Systematic Cabinet of Shells," 10 vols 4to, and 1 of Suppl., with coloured plates. Nuremberg.

The three first volumes, 1769—1777, are from his pen, the other from that of Chemnitz.

MATHIOLE (P. A), of Sœna, born 1500, died 1577.

In his Commentary on Dioscorides, he enters into details of various animals.

MAUD.—MAUDUIT (R. J. E.), a physician at Paris, who died in 1792.

Author of the "Dictionnaire des Oiseaux" of the Encyclopédie Méthodique.

MAUPERT.—MAUPERTIUS (P. L. M. de), member of the Académie des Sciences, president of that of Berlin, &c. born 1678, died 1759. An astronomer and geometrician, also author of certain Memoirs on Natural History.

"Expériences sur les Scorpions," in the Mémoires de l'Acad. des Sciences, 1731.

MAURICE DE NASSAU (Prince), or rather Count John Maurice de Nassau-Siegen, born 1604, the Dutch governor of Brazil from 1637 to 1644.

He encouraged the labours of Marcgrave in that country, and drew several fishes which have been engraved and published in the Icthyology of Block. He died in the service of Brandebourg in 1679.

MECKEL (J. F.), Professor at Halle. We quote his

"Materials for Comparative Anatomy" (in German), 8vo. Leipzic, 1808.

"A Treatise on the Ornithorhynchus," folio. Leipzic, 1826.

MEG.—MEGERLE DE MUHLFIELD (J. C.).

Author of "A Classification of Bivalve Shells," inserted in the Magazine of the Society of the Friends of Nature of Berlin.

MEHLIS (Edward).

"De Distomate Hepatico et Lanceolato," folio. Gottingen, 1825.

MEIG.—MEIGEN (J. G.), a German naturalist.

This author has published (in German), a work on the "Diptera of Europe," now forming 5 vols 8vo, accompanied with plates representing at least one species of each genus, with the details of their characters.

M. Baumauer published an extract from the same work, under the title of a "Nouvelle Classification des Mouches à deux ailes," 8vo. Paris, 1800.

MEM. DE LA SOC. D'HIST. NAT.

"Mémoires de la Société d'Histoire Naturelle de Paris," 1 vol. 8vo, 1799, the only one that appeared.

There is another work with a similar title, in 3 vols 4to, 1823, et seq.

MERIAN (M. S.), a German lady established in Holland, born 1647, died 1717. She has left us two posthumous works, remarkable for the beauty of the drawings:

"De Generatione et Metamorphosibus Insectorum Surinamensis," 1 vol. folio. The Hague, 1726.

"Histoire des Insectes d'Europe, translated into French by Mairet, 1 vol. folio. Amsterdam, 1730.

MERR.—MERREM (Blaise), born at Bremen, Professor of Natural History at Marburg.

"Avium Rariorum et minus Cognitarum, Icones et Descript.," four Nos. 4to. Leipzic, 1786.

"Materials for the Natural History of Reptiles" (in German), 2 Nos. 4to. Duisbourg and Lemgo, 1790. All that it contains relates to Serpents.

"Tentamen Systematis Amphibiorum," in Latin and German, 1 vol. 8vo. Marburg, 1820.

MESNARD.—MESNARD DE LA GROYE, a naturalist of Angers and my adjunct in the Collége de France, died in 1827.

Author of various Memoirs in the Annales du Museum, Journal de Physique, &c.

MEYER and **WOLF**.

"Taschenbuch," &c., or Almanack of the Birds of Germany, 2 vols 8vo., Franckfort, 1810. The first volume contains the terrestrial birds by Wolf; the second the water-birds by Meyer. This work is filled with excellent observations.

MIG.—MIGER (Felix), a naturalist at Paris.

"Memoire sur les Larves des Insectes Coléoptères Aquatiques," inserted in the fourteenth volume of the Annales du Museum.

MIK.—MIKAU (I. C.), a Bohemian naturalist.

"Monographia Bombyliorum Bohemiæ," with plates, 8vo. Prague, 1796.

MILLER (J. S.), an English naturalist.

"Natural History of the Crinoides," and a "Memoir on the Belemnites," 4to. Bristol, 1821. In the Transactions of the Geological Society of London, second series, vol. II, part I.

MITCHILL, an American naturalist and physician.

I chiefly quote his work on the "Fishes of New York," in the Trans. of the Literary and Philosophical Society of New York. He has also published other Memoirs in the Annals of the New York Lyceum, and in the Journ. of the Academy of Natural Sciences of Philadelphia.

Moehr.—Moehring (P. H. G.), a physician at Jever.

"Avium Genera," 8vo. Aurich, 1752.

Molin.—Molina (the Abbé J. I.), an ecclesiastic of Chili, resident in Italy.

"Essai sur l'Histoire Naturelle du Chili," in Latin, and translated into French by Gruvel, 1 vol. 8vo. Paris, 1789. This work was written in Italy from memory, and contains many doubtful passages.

Moll. (J. P. C. de), see **Fichtel.**

Montag.—Montagu (George), an English naturalist.

Author of descriptions of various species of Birds, Fishes, Mollusca and Crustacea, in the Transactions of the Linnean and Wernerian Societies of London.

Montègre, a physician of Paris, who died in the colonies.

I quote his "Mémoire sur les Vers de terre," published in the Mémoires du Muséum.

Montf.—Montfort (Denis de), a singular man who styled himself an ancient naturalist of the King of Holland; he perished through want in the streets of Paris in 1820 or 1821. I principally quote his

"Conchyliologie Systematique," a sort of Genera Conchyliorum, where the genera are extremely numerous, and represented by wood cuts, executed by the author, in as exact a manner as can be done by that species of engraving.

There are but two volumes 8vo, which contain the Univalves only. Paris, 1808, 1810.

He is also the author of the four first volumes of the "Histoire Naturelle des Mollusques," that form a sequel to Sonnini's Buffon, Paris, 1802, in which he has inserted apocryphal figures. They merely contain the generalia and the Cephalopoda.

Moq. Tand.—Moquin-Tandon (A), a physician of Montpellier, Professor at Marseilles.

"Monographie de la famille des Hirudinées," 4to. Montpellier, 1826.

Moreau de Jonnes, corresponding member of the Institute.

Quoted as author of several Memoirs on the animals of the Antilles.

Morren, (C. F. A.), a naturalist of Belgium.

"De Lumbrici Terrestris Historia Naturali nec non Anatomia," 4to. Brussels, 1829.

Mouff.—Mouffet (Thomas), an English naturalist, died about 1600.

"Insectorum sive Minimorum Animalium Theatrum," 1 vol. folio, with five hundred wood cuts. London, 1634.

It was published by Theodore de Mayerne, a Frenchman and physician to James I. It is the first special work on Insects.

Stat. Mull.—Muller (Philip Louis Statius), Professor at Erlang, born in 1725, died 1776.

Author of a bad translation, into German, of the Systema Naturæ of Linnæus, from the Dutch translation of Houttuyn, 9 vols 8vo., Nuremb., 1773—1776, containing the animals only.

Mull.—Muller (O. F.), a Dane, Counsellor of State, and one of the most laborious observers of the eighteenth century, born 1730, died 1784. I quote his

"Von Würmern der Süssen und Salzigen Wassers," 1 vol. 4to, or fresh and salt-water worms.

"Verminium Terrestrium et Fluviatilium Historia," 2 vols 4to.

"Zoologica Danica," folio, with coloured plates. The three first numbers, Copenhagen, 1788, 1789, are from his pen; the fourth from Abildgaardt, Vahl, &c.

"Zoologia Danica Prodromus," 1 vol. 8vo. Hafniæ, 1776.

"Entomostraca seu Insecta Testacea," 1 vol. 4to, with plates. Lips. and Havniæ, 1785.

"Hydrachnæ," 1 vol. 4to, with coloured plates. Lipsiæ, 1781.

"Animalcula Infusoria," 1 vol. 4to.

Naccari (L. F), librarian of the seminary of Chioggia.

"Ittiologia Adriatica," published in the Physical Journal of Pavia, vol. V, Dec. 11, 1822.

Nardo (Domenico), an Italian naturalist established at Chioggia.

He made some additions to the work of Naccari in the Physical Journal of Pavia, XVII.

Natter.—Natterer, an Austrian naturalist, who travelled in Brazil.

Author of various interesting observations on the animals of Germany.

Naturf.—Naturforscher.

"Der Naturforscher," or the Naturalist. The title of a German Journal on Natural History, of which twenty-seven numbers were published at Halle, from 1774 to 1793. It abounds in important observations and good figures.

Naum.—Nauman (J. A. and J. F.), father and son.

"Natural History of the Birds of Germany." An excellent work, the plates of which, though small, are perfect. The second edition, 8vo, Lips., 1820, et seq.—which we chiefly quote—is not yet terminated.

Nees d'Esenb. See **Gravenhorst.**

Nicols.—Nicolson, an Irish Dominican, missionary to St Domingo.

"Essai sur l'Histoire Naturelle de St Domingue," 8vo, with plates. Paris, 1776.

Nieremb.—Nieremberg (J. E.), a Jesuit, Professor at Madrid.

"Historia Naturalis maxime peregrina, libris XVI distincta," folio, Anvers, a compilation of but little value.

Nils.—Nilson (S. V.), Curator of the Lund Museum.

"Ornithologia Suecica," 2 vols 8vo. Copenhagen, 1817, 1821.

Nitzch (C. L.), Professor at Halle.

Author of various Memoirs on the osteology of Birds and the Invertebrata, published among those of Halle, Bonn, &c.

"Spiropteræ Stramosæ Descr., 4to. Halle, 1829.

"Materials for a History of the Infusoria, or a description of the Cercariæ and Bacillariæ," 8vo, in German. Halle, 1817.

Nosem.—Noseman (N.), died 1786.

In conjunction with the engraver, Christian Sepp, author of a "History of the Birds of the Netherlands" (in Dutch), folio, with remarkably beautiful plates. The last numbers are by Houttuyn. Amsterdam, 1770, et seq.

Ochsenh.—Ochsenheimer (Ferdinand).

His work written in German on the "Lepidoptera of Europe," is the best that has been published with respect to critical accuracy and the descriptions of the species. The first volume appeared at Leipzic in 1806. The one he is about to publish will contain the Noctuæ.

Odier (Auguste).

"Mémoire sur la Composition Chimique des parties cornées des Insectes," inserted in the first volume of the "Mémoires de la Soc. d'Hist. Nat.," 4to, 1823.

Oken, a German naturalist of Fribourg in Brisgau, established at Jena.

"Philosophy of Nature," 3 vols 8vo. Jena, 1809.

"A Treatise on Natural History," of which the Zoology forms the third part, in 2 vols 8vo, with an Atlas. Jena, 1816.

"A Natural History for Schools," 1 vol. Jena, 1821.

"Esquisse de Système d'Anatomie, de Physiologie, et d'Histoire Naturelle," 8vo. Paris, 1821.

He is the principal editor of the Isis, a journal which abounds in important articles relative to natural history.

Olafsen (Eggert), or Erard **Olavius**, a naturalist of Iceland, born 1726, died 1768.

Jointly with Biorn Povelsen, or Pauli, the first physician of that island, who died in 1778, author of a "Journey in Iceland," printed in 1772. I quote the French-translation, 5 vols 8vo, with an atlas. Paris, 1802.

Olivi (The Abbé Joseph).

"Zoologia Adriatica," 1 vol. 8vo, with plates. Bassano, 1792.

It contains excellent observations on the Mollusca and Crustacea.

Oliv.—Olivier (Antoine-Guillaume), member of the Académie des Sciences, Professor of Zoology to the Ecole Véterinaire of Alfort, &c., born at Draguignan 1756, died 1814.

"Entomologie, ou Histoire Naturelle des Insectes" (Coleoptera), 5 vols folio, with coleured plates. Paris, 1789—1808.

Insects of the Encyclopédie Methodique, from the fourth volume of the Natural History to the eighth inclusively.

"Voyage dans l'Empire Ottoman, l'Egypte et la Perse," 3 vols 4to, with plates. Paris, 1807. It contains interesting species of several classes of animals.

Omalius de Halloy, governor of the province of Namur, and a learned geologist.

Oppel (Michael), a Bavarian naturalist who died in 18 .

"Sur la Classification des Reptiles." The first Memoir is on the Ophidia, the second on the Batrachia, published in the Annales du Muséum.

"The Orders, Families and Genera of Reptiles" (in German), 4to. Munich, 1811.

I also quote his Memoir on the Tanypus, inserted in the Memoirs of the Academy of Munich, 1812.

In conjunction with Messrs Tiedeman and Liboschitz, he commenced a work on Reptiles, with numerous plates, of which the Crocodiles only were published. Heidelberg, folio, 1817.

Osbeck (Peter), a pupil of Linnæus, and chaplain of a Swedish vessel that went to China in 1750.

His narrative was printed in the Swedish language in 8vo, Stockholm, 1757, and translated into German by G. Rostock, 8vo, 1765.

Otto (A. W.), a German naturalist, Professor at Breslau.

Author of several memoirs among those of the Academy of Sc., of Nature and other collections.

"Conspectus Animalium quorundam," &c. Breslau, 1821.

"De Stermaspide Thalassemoides et Siphostomate Diplochaito," 4to. Breslau, 1820.

Palis. de Beauv.—Palisot, Baron de Beauvois (A. M. F. J.), member of the Académie des Sciences, born 1755, died 1820.

"Insectes recueillis en Afrique et en Amérique," &c., folio, with coloured plates. Paris, 1805 et seq.

Pall.—Pallas (P. S.), one of the great Zoologists of modern times, born at Berlin 1741, died 1812. I quote his

Glir.

"Novæ Species Quadrupedum e Glirium Ordine," 4to, with thirty-nine coloured plates. Erlang, 1778.

Spic. or **Spic. Zool.**

"Spicilegia Zoologica," fourteen numbers, 4to. Berlin, 767—1780.

Miscel.

"Miscellanea Zoologica," 1 No. 4to. Haga, 1766.

Voy.

"Voyage dans plusieurs provinces de l'Empire de Russie," French Tr., 8vo, with an atlas. Paris.

Nord. Beytr.

"Neue Nordische Beytræge," &c. (or New materials from the North for Geography, &c.), 7 vols 8vo. Petersburg and Leipzic, 1781—1796.

"Zoographia Russo-Adriatica," 3 vols 4to. Some of the plates of this work having been mislaid, it has not yet been published, though the Academy of St Petersburg have granted the use of the MSS. to certain naturalists.

Several of his Memoirs inserted among those of the Academy last mentioned.

Panz.—Panzer (G. W. F.), a physician of Nuremberg, born in 1755.

"Faunæ Insectorum Germanicæ initia, or Deutschlands Insecten," one hundred and nine numbers, 12mo, each consisting of twenty-four coloured plates. Nuremberg, 1796, et seq. One of the most useful entomological works we possess on account of the accuracy of the figures.

"Entomologischer Versuch uber die Jurineschen Gattungen der Linneischen Hymenoptern," 1 vol. 12mo. Nuremberg, 1806.

"Index Entomologicus, pars prima, Eleutherata," 1 vol. 12mo. Norembergæ, 1813.

He has also published several other works on Insects, which I have not had occasion to quote.

Park.—Parkinson (James), an English naturalist.

"Outlines of Oryctology," 1 vol. 8vo, with plates.

"Organic Remains of a Former World," 3 vols 4to. London, 1811.

Parra (Don Antonio), an American naturalist.

Author of a "Description of various portions of Natural History," and chiefly of marine productions, written in Spanish, 4to. Havana, 1784.

In this work the author describes and figures many fishes and Crustacea.

Passer.—Passerini (Charles).

"Observations on the sound produced by the Sphinx Atropos," in Italian, from which M. Dufronches has given an extract.

Paykull (Gustavus), Counsellor to the King of Sweden, and member of the Academy of Stockholm.

"Fauna Suecia" (Insecta), 3 vols 8vo. Upsal, 1800.

These three volumes refer exclusively to the Coleoptera; his descriptions are carefully and completely given.

He has also published good Monographs of the genera Carabus, Curculio and Staphylinus, but they are incorporated with the Fauna.

"Monographia Histeroideum," with plates of all the species, 1 vol. 8vo. Upsal, 1811. This Monograph is superior to the preceding ones, and is indispensably requisite for the study of these Insects.

He has published certain Memoirs on Birds.

Peck (William), Professor of Botany at the university of Harvard, died in .

Author of a Memoir inserted in the fourth volume of the Agricultural Journal of Massachusetts, relative to a species of Rhynchænus, that attacks the Pine.

Penn. Pennt.—Pennant (Thomas), a Welchman, born in 1726, died in 1798. A laborious naturalist. The works we chiefly quote are his

"History of Quadrupeds," 2 vols 4to.
"British Zoology," 1 vol. folio.
"British Zoology," 4to and 8vo, 4 vols.
"Arctic Zoology," 2 vols 4to.
"Indian Zoology," 1 vol. 4to.

Pernetty, a Benedictine who accompanied Bougainville to the Faulkland Islands; he was afterwards librarian to Frederick II of Prussia.

"Voyage aux Iles Malouines," 2 vols 8vo. Paris, 1770. It contains some valuable details on Natural History and useful figures.

Per.—Peron (François), born at Cerilly in 1775, died in 1810, a zealous traveller, prematurely snatched from the sciences, and one of those who have most contributed to enrich the Museum of Paris.

"He edited the first volume of the "Voyage de découverte aux Terres Australes en 1800—1804," 1 vol. 4to, with an atlas. Paris, 1807.

He was also the author of various Memoirs published in the Annales du Muséum.

Perrault (Claude), a naturalist, architect of the Louvre and Observatory of Paris, born 1613, died 1688.

He published, from the dissections of Duverney, the "Mémoires pour servir a l'Histoire Naturelle des Animaux," which form the third volume of the Mém. de l'Acad. des Sciences, previous to 1699.

Petag.—Petagna, (V.), of Naples.

"Specimen Insectorum Ulterioris Calabriæ," 4to, with one plate. Francofurti, 1787.

"Elements of Entomology," 2 vols 8vo.

Petersb. or Petrop. Mem., or Comment., or Nov. Comment., or Act., or Nov. Act.

Such are the various titles of the Memoirs of the Imperial Academy of Sciences of St Petersburg.

The "Commentarii," 14 vols 4to, from 1726 to 1746.

The "Novi Commentarii," 20 vols, from 1749 to 1775.
The "Acta," 7 vols, from 1777 to 1782.
The "Nova Acta," 15 vols, from 1783 to 1802.
The "Memoirs," from 1809.

Phelsum (Murck Van), a Dutch naturalist.

"Quoted for his "Letter to C. Noseman on the Echini," 8vo. Rotterdam, 1774.

Phillip (Arthur), a German, and Governor of Botany Bay, in the English service.

"The Voyage of Governor Phillip to Botany Bay," &c., with fifty-five coloured plates, London, 1789. An anonymous work, the part relative to natural history by Latham. There is a French translation of it without plates, in 1 vol. 8vo. Paris, 1791.

Phips (C. J), the celebrated English navigator, subsequently Lord Mulgrave; born 1746, died 1792.

"Voyage to the North Pole in 1773," translated into French by Desmeuniers, 1 vol. 4to. Paris, 1775.

Planc.—Plancus (Janus) or J. **Bianchi**, a physician of Rimini, born in 1693, died in 1775.

"De Conchis minus notis," 1 vol. 4to, with plates. Venice, 1739. The second edition greatly enlarged, Rome, 1760.

Pl. Col.—Planches Coloriees.

"Planches Coloriées des Oiseaux, par MM. Temminck and Laugier," 4to and folio, a great work which forms a sequel to the Planches Enluminées, &c. of Buffon.

Pl. Enl.—Planches Enluminees.

The coloured plates of Birds, published for Buffon's Natural History, by Dubenton, Jun., amounting to one thousand and eight, but arranged without order. It is beyond all doubt the richest collection of that class that has ever appeared. Most of the figures are good.

Plum.—Plumier (Charles), a Minim, who travelled for a long time in the service of Louis the Fourteenth; he was a great naturalist in all the branches of the science, although several of his works have remained unpublished.

I have had occasion to quote his observations on Fishes and Reptiles, part of which are at Paris and part at Berlin, all in MS., with numerous drawings; a portion of them has been published by Bloch and Lacépède.

Poli, a naturalist and anatomist at Naples, author of the magnificent work, entitled

"Testacea utriusque Siciliæ eorumque Historia et Anatome," 2 vols folio. Parma, 1791 and 1795. A third volume has been lately published.

PREV.—PREVOST (Benedict).

"Mémoire sur le Chirocéphale," published at the end of the Histoire des Monocles of Jurine. See Jurine.

PREYS.—PREYSLER (J. D.).

"Werzeichniss Bochmischer Insecten," 1 vol. 4to. Prague, 1790.

PR. MAX.—MAXIMILIAN PRINCE, DE WIED-NEUWIED.

His "Voyage to Brazil," 2 vols 4to, with an atlas, Franckf., 1820 and 1821, his "Natural History of Brazil," of which two vols 8vo were published at Weimar, 1826, and several numbers of coloured plates, in folio, are among the number of those productions of modern times which are richest in novelties.

PRUNN.—PRUNNER (Leonard de).

"Lepidoptera Pedemontana," 1 vol. 8vo. Turin, 1798.

Q. and G. or QUOY and GAYM., or GAIM.—QUOY and GAYMARD, fellow travellers who have already made two great voyages.

They have published the "Zoologie du Voyage de l'Uranie," 1 vol. Paris, 1824, with one volume folio of plates. They are at present occupied with that of the "Voyage de l'Astrolabe," of which several numbers have already appeared.

RAFFLES (Sir Stamford), an English general and Governor of Sumatra, who has greatly contributed to our knowledge of the productions of that island.

I quote his paper on this subject in the thirteenth volume of the Linnean Transactions.

RAF.—RAFINESQUE SCHMALTZ (C. S.), naturalist, long a resident in Sicily, and at present established in the United States.

Author of numerous little works on new species, genera and systems.

"Caratteri di alcuni nuovi Generi et nuove Specie di Animali e Piante della Sicilia," 8vo. Palermo, 1810.

"Indice d'Ittiologia Siciliana," 8vo. Palermo, 1810.

"Principes Fondamentaux de Sémiologie." Palermo, 1814.

"Analyse de l'Univers, ou Tableau de la Nature," 8vo. Paris, 1815.

"Icthyologia Ohiensis, or Natural History of the Fishes inhabiting the river Ohio," &c. 8vo. Lexington, Kentucky, 1820.

RAY (John), an English theologian, born 1628, died 1704; the first true methodiser of the animal kingdom, and the principal guide of Linnæus in that department of the natural sciences.

"Synopsis Methodica Animalium Quadrupedum et Serpentum," 8vo. London, 1693.

"Synopsis Methodica Avium et Piscium," 8vo. London, 1783.

"Historia Insectorum," 4to. London, 1710.

Randohr (C. A.), a German naturalist.

Author of a treatise "On the Digestive Organs of Insects," in the German language, 4to, Halle, 1811; and of "Materials for the History of certain German Monoculi," 4to. Ibid. 1805.

Rang (Sander), an officer of the Corps Royal of the French Navy, an able naturalist.

"Manuel de l'Histoire Naturelle des Mollusques et de leurs Coquilles," 12mo. Paris, 1829.

"Etablissement de la famille des Béroides," published in the fourth volume of the Mem. de la Soc. d'Hist. Naturelle.

"Histoire Naturelle des Aplysies," 4to. Paris, 1828.

Ranzani (The Abbé Camillo), Professor of Natural History at Bologna, &c.

"Elements of Zoology" (in Italian). Bol., 1819, et seq., of which thirteen volumes, 8vo, have already appeared, all relating to Quadrupeds and Birds.

"Memoirs on Natural History" (also in Italian), 4to. Bologna, 1820.

Rapp (William), Professor at Tubingen.

"On the Polypi in general and the Actiniæ in particular," 4to. Weimar, 1829.

Reaum.—Reaumur (R. A. Ferchault de), member of the Académie des Sciences, born 1683, died 1757; his labours were directed to all the sciences. We chiefly quote his

"Mémoires pour servir a l'Histoire des Insectes," 6 vols 4to, with plates. Paris, 1734—1742. The seventh volume remains in MS.; the others were not commenced. An admirable work.

Red.—Redi (F.), a celebrated literary character and physician of Arezzo, born 1626, died 1698.

"Experimenta circa Generationem Insectorum," 3 vols 12mo, with plates. Amstelodami, 1671, 1686, 1712.

Reich.—Reichenbach (H. T. L.).

"Monographia Pselaphorum," 1 vol. 8vo, with plates. Lipsiæ, 1816.

Reinw.—Reinwardt, a German naturalist, Professor at Leyden, who travelled through the Archipelago of India where he made a splendid collection.

Renard (Louis), editor of a collection of drawings of Fishes and other marine animals executed in India by native painters, which, under a barbarous appearance, exhibits interesting and true species. One vol. folio. Amsterdam, 1754.

Renimeri, an Italian naturalist, Professor at Padua.

Rets.—Retsius, a Swedish naturalist, Professor at Lund.

"Author of a greatly enlarged edition of the "Fauna Suecica" of Linnæus, of various theses, &c.

Richards.—Richardson (John), surgeon to the first expedition under captain Franklin.

Author of the Zoological appendix attached to the account of that voyage. London, 1823, in 4to.

Riss.—Risso (A.), a naturalist of Nice and a zealous observer.

"Ichthyologie de Nice," &c., 1 vol. 8vo, Paris, 1810, a work of extreme value on account of the number of new species which it contains.

"Histoire Naturelle des Crustacés des environs de Nice," 1 vol. 8vo, with plates. Paris, 1816.

These works have been reproduced in his "Histoire Naturelle de l'Europe Merid.," 5 vols 8vo. Paris, 1826.

He has also published a description of some new Crustacea in the Journal de Physique.

Robin.—Robineau Desvoidy, physician at St Sauveur, department of the Yonne.

"Recherches sur l'Organisation Vertebrales des Crustacés, des Arachnides, et des Insectes," 1 vol. 8vo. Paris, 1828.

"Essai sur la tribu des Culicides," inserted in the second volume of the Mémoires de la Societé d'Histoire Naturelle.

A great work on the Muscidæ which he calls "Myodaires," published in the Mém. des Savants Etrangéres, &c.

"Observations on the Olfactory Organ of the Crustacea and on the use of the Halteres of the Diptera."

Rochefort (N.), a protestant minister of Holland.

"Natural and Moral History of the Antilles and America." The first edition is anonymous and published at Rotterdam, 1658. The part relative to Natural History is copied from the first edition of Dutertre, 1654.

Rœm.—Rœmer (J. C.).

"Genera Insectorum Linnæi et Fabricii, Iconibus illustrata," 1 vol. 4to. Vitoduri Helvetiorum, 1789.

His work is merely an edition of that of Sulzer on the same subject; with some new plates.

Rœs.—Rœsel de Rosenhof (A. J.), a painter of Nuremberg, born 1705, died 1795, one of the most ingenious observers and an able painter of subjects of Natural History.

"Historia Naturalis Ranarum nostratium," 1 vol. folio. Nuremb., 1758.

"Insecten-Belustigungen," with excellent coloured plates, 4 vols 4to. Nuremb., 1746, et seq. See Kleemann.

Rog.—Roger, a naturalist of Bourdeaux.

"Instructions à l'usage des personnes qui voudraient s'occuper a recueillir des Insectes pour les Cabinets d'Histoire Naturelle," 8vo. Bourdeaux.

Roiss.—Roissy (Félix de), a naturalist of Paris.

He completed, by the 5th and 6th vols 8vo, the "Histoire des Mollusques" commenced by Denys de Montfort for Sonnini's Buffon.

Rondel.—Rondelet (Guillaume), Professor at Montpellier, born 1507, died 1566.

"Libri de Piscibus," 1 vol. folio. Lyons, 1554, a work still useful from its numerous wood-cuts.

Ross.—Rossi (Pietro), an Italian naturalist, Professor at Pisa, died in 18 .

"Fauna Etrusca, sistens Insecta quæ in provinciis Florentina et Pisana præsertim collegit Petrus Rossius," 2 vols 4to, with coloured plates. Liburni, 1790.

"Mantissa Insectorum exhibens Species nuper in Etruria collectas, a Petro Rossio," &c. with coloured plates, 2 vols 4to. Pisis, 1792—1794.

Roux (Polydore), Curator of the Museum of Marseilles.

"Ornithologie Provençale," 4to, with beautiful lithographic plates.

"Crustacés de la Mediterranée et de son littoral," 4to, with plates, the three first numbers. Marseilles, 1827—1828.

Roxburgh, an English physician at Bengal.

I quote his paper on the Dolphin of the Ganges.

Rudolphi (C. A.), a German naturalist and anatomist, Professor at Gripswald and now at Berlin. Chiefly quoted for his classical work on the Intestinal Worms.

"Entozoa seu Vermium Intestinalium Historia Naturalis," 2 vols 8vo. Amsterdam, 1808.

Rumph (G. E.), a German merchant born at Hanau in 1637, Intendant at Amboyna in the Dutch service, died in 1706.

"The Cabinet of Amboyna" (in Dutch), 1 vol. folio. Amsterdam, 1705.

"Thesaurus Imaginum," &c. Haga, 1739, 1 vol. folio, with the same plates but a more abridged text.

Ruppel (Edward), a naturalist of Franckfort.

Author of "Travels in Nubia," with excellent lithographic and coloured plates, representing new species of various classes, of which several numbers are already published in 4to. Franckf., 1826.

Russel (P.), formerly a surgeon at Bengal.

"Serpents of the coast of Coromandel," 1 vol. folio, with a supplement and excellent plates. London, 17 .

"Description and figures of two hundred Fishes from the Coast of Coromandel," 2 vols folio. London, 1803. Two capital works.

Ruysch (Henry), son of the celebrated anatomist; he died before his father. Under the title of

"Theatrum Animalium," 2 vols folio, Amsterd., 1718, he gave an edition of Johnstone, to which he added a copy of the same plates of fishes employed by Renard and Valentin.

Sabine, an English naturalist.

Author of the appendix to Captain Parry's first voyage, and of various papers in the Transactions of the Linnean Society.

Sage (B. G.), Chemist of the Academy of Sciences, died 1824.

"Mémoire sur les Belemnites," published in the Journal de Physique.

Sahl.—Sahlberg (C. R.).

"Dissertatio Entomologica Insecta Fennica enumerans," Præs. C. R. Sahlberg, 8vo. Aboæ, 1717, 1823.

"Periculi Entomographici," 1 vol. 8vo, with plates. Aboæ, 1823.

Salerne, a physician of Orleans.

Author of a translation of the "Synopsis Avium" of Ray, under the title of "l'Histoire Naturelle éclaircie dans une de ses principales parties, L'Ornithologie," &c. 4to. Paris, 1767.

The drawings are by the same hand that furnished those of *Brisson* and of the Planches Enluminées, and are frequently taken from the same specimens.

Salt, English consul in Egypt.

"Travels in Abyssinia." They contain some observations relative to natural history.

Salv.—Salviani (Ippolito), of Citta di Castello, a physician at Rome, born 1513, died 1572.

"Aquatilium Animalium Historiæ," 1 vol. folio, with numerous and excellent copperplate engravings of Fishes. Romæ, 1554.

Sav., or Savign.—Savigny (J. C.), member of the Académie des Sciences.

"Histoire Naturelle et Mythologique de l'Ibis," 1 vol. 8vo. Paris, 1805.

"Mémoires sur les Oiseaux de l'Egypte," in the great work on Egypt.

"Mémoires sur les Animaux sans Vertèbres," part first, No. 1, 8vo. Paris, 1816.

"Système des Annelides," published in the great work on Egypt, as well as his "Tableau Systematique des Ascidies."

Savi (Paulo), a young naturalist of Tuscany and Professor at Pisa.

Author of various good observations on the animals of that country, published in the Giornale dei Letterati. He has given in Italian two memoirs on a species of Iulus, which have lately been reproduced with others of the same savant, in a work entitled "Memorie Scientifiche di Paolo Savi, decade prima con sette tavole," 1 vol. 8vo. Pisa, 1828.

SAY (Thomas), an American naturalist.

Author of various papers in the Journal of the Academy of Natural Sciences of Philadelphia, and the Annals of the New York Lyceum.

SCHÆFF.—SCHÆFFER (J. C.), a clergyman at Ratisbonne, born 1718, died 1799.

"Elementa Entomologica," with coloured plates, 1 vol. 4to. Ratisbonne, 1769.

"Icones Insectorum circa Ratisbonam Indigenorum," 3 vols 4to. Ratisbonne, 1769.

"Apus pisciformis Insecti Aquatici Species noviter detecta," 4to, with plates. Ratisbonne, 1757. This Crustaceous animal is the Cancer Stagnalis of Linnæus. See Branchipus.

"Abhandlungen von Insecten." Regensburg, 1764—1779.

SCHELLENB.—SCHELLENBERG (J. R.), painter and engraver at Zurich.

"Cimicum in Helvetiæ Aquis et Terris degens Genus," with plates, 1 vol. 8vo. Turici, 1800.

"Genres des Mouches Diptéres," in French and German, with coloured plates. Zurich, 1803. The text is by two anonymous writers.

SCH., or SCHEUCHZ.—SCHEUCHZER (J. J.), a physician of Zurich.

"Physique Sacrée," 4 vols folio. Amsterdam, 1732. It contains numerous figures of Serpents.

SCHINTZ, Secretary of the Society of Natural History at Zurich, the translator into German of the Régne Animal.

Author of the "History of the Eggs and Nests of Birds."

SCHLOSS.—SCHLOSSER, a physician at Amsterdam.

"Author of certain Memoirs on Fishes, jointly with Boddaert, published in the Philosophical Transactions.

SCHN.—SCHNEIDER (J. G.), the celebrated hellenist and naturalist, Professor at Franckfort-on-the-Oder, now at Breslau.

"Amphibiorum Physiologiæ Specim.," 4to, Fascic. I et II. Zullichow, 1797.

"Historiæ Amphibiorum Naturalis et Litterariæ," 8vo., Fascic. I et II. Jena, 1799, 1801.

"The Natural History of Torteises in general" (in German), 1 vol. 8vo. Leipsic, 1783.

I frequently quote under his name his edition of the "Systema Ichthyologiæ" of Bloch, 8vo, with one hundred and ten plates. Berlin, 1801.

SCHŒPF (J. D.), a physician at Anspach, born 1752.

"Historia Testudinum Iconibus Illustrata," 4to, with coloured plates. Erlang, 1792, et seq.

Schonefeld (E. de), a physician of Hamburg.

"Icthyologia, &c., ducatum Slesvigi et Holsatiæ," 4to. Hamburg, 1824.

Schon.—or **Schœnh.**—**Schœnherr** (C. J.), a Swede.

"Synonymia Insectorum," 2 vols 8vo, with plates. Stockholm, 1806—1808.

"Curculionidum Dispositio Methodica," 1 vol. 8vo. Leipzic, 1826.

Schrank (F. de P.), a Bavarian naturalist, Professor at Ingolstadt, born in 1747.

"Enumeratio Insectorum Austriæ Indigenorum," 1 vol. 8vo, with plates. Augustæ Vindelicorum, 1781.

"Fauna Boica," 6 vols 8vo. Nuremberg and Ingolstadt, 1798, et seq.

Schreb.—**Schreber** (J. C. de), Professor at Erlang, born in 1739.

We chiefly quote his "History of the Mammalia" (in German), with coloured plates, 4to. Erlang, 1775, et seq.

There are also some French copies of the first parts. The greater part of the plates is copied from Buffon and coloured from the descriptions, although some of them are original and good.

Schreib.—**Schreibers** (Charles de), Director of the Imperial Museum of Vienna.

The description of various unpublished or but little known Coleoptera, with plates, inserted in the sixth volume of the Transactions of the Lin. Society.

A Memoir on the Proteus in the Philosophical Transactions.

Schrœt.—**Schrœter**, (J. S.), Lutheran superintendent at Buttstedt in the Duchy of Weimar, born in 1735. Author of numerous works on Conchyliology; we quote his

"History of Fresh-water Shells" (in German), 4to. Halle, 1979.

Schweig.—**Schweigger** (A. F.), a Prussian naturalist who was assassinated by his guide during a journey in the interior of Sicily.

"Prodromus Monographiæ Cheloniorum," in which he particularly describes the new species in the Museum of Paris. It is published in the "Archives of Kœnigsberg" for 1812. He has also given us

"Observations during his Travels," in which he treats of the Corallines and yellow Amber, 4to. Berlin, 1819.

"A Manual of the Invertebrate and Inarticulated Animals," 1 vol. 8vo. Leipzic, 1820.

Scilla (Agostino), a Sicilian painter.

"La Vana Speculatione disingannata dal Senso," 1 vol. 4to. Naples, 1670.

The first exact comparison of fossils with analogous recent bodies that was instituted. There is a Latin translation of this work in 4to. Rome, 1752.

Scop.—Scopoli (J. A.), Professor of Botany and Chemistry at Pavia, born in 1723, died in 1788.

"Entomologia Carniolica," 1 vol. 8vo. Vindebonæ, 1763.

"Deliciæ Floræ et Faunæ Insubricæ," with plates, 4 vols folio. Ticini, 1786—1788.

"Introductio ad Historiam Naturalem," 1 vol. 8vo. Pragæ, 1777.

"Anni Historici-Naturales, V." Lipsiæ, 1768—1772, united in one vol. 8vo.

"He has also published some plates which are but little known, forming a sequel to his "Entomologia Carniolica."

Scoresby, an English navigator who re-discovered Oriental Greenland, and author of

"Arctic Regions," &c., 1 vol, London, 1816, which contains many valuable observations on the Cetacea.

Seb.—Seba (Albert), a druggist of Amsterdam, born in 1665, died in 1736. Celebrated for his

"Locupletissimi Rerum Naturalium Thesauri Accurata Descriptio," 4 vols folio. Amsterdam, 1734, 1765.

A work that I have frequently quoted, because it is enriched with numerous and excellent plates; the text, however, is of no authority whatever, being written without accuracy or judgment.

Selby (P. J.).

Author of "Illustrations of British Ornithology," 8vo, Edinburgh, 1825, with a very large atlas, the most magnificent work on Ornithology that exists [that of our countryman, M. Audubon, excepted, which the Baron himself in a late report to the Institute declares to be "the most magnificent monument the arts have ever erected to the Science." Am. Ed.].

He has also published various papers in the Zoological Journal, &c.

Senguerd.—Senguerdius (Wolferd).

"Tractatus Physicus de Tarentula," 1 vol. 12mo. Lugduni Batavorum, 1668.

Serres (Marcel de), Professor of Mineralogy to the Faculté des Sciences of Montpellier. Author of

"Mémoire sur les yeux composés, et les yeux lisses des Insectes," with plates, 1 vol. 8vo. Montpellier, 1813.

Several Memoirs on the Anatomy of Insects, published in the Annales du Muséum.

Serv.—Serville, one of the writers for the Entomological Department of the Faune Française, and of the Encyclopédie Méthodique.

He has also published the last number of the work of the late Palisot de Beauvois on the Insects collected by him in Africa and America; as well as extracts from various works on Insects, in the "Bulletin Universel" of Baron Férussac.

Shaw (Thomas), a theologian of Oxford, who travelled in Africa and the Levant.

His work, published in English at Oxford, in folio, 1738, has been translated into French under the title of "Voyage dans plusieurs parties de la Barbarie et du Levant," 2 vols 4to. La Haye, 1743.

Sh. or **Shaw.**—**Shaw** (George), Adjunct Librarian of the British Museum, a laborious compiler and describer, died in 1815.

"The Naturalist's Miscellany," 8vo. London, 1789, et seq.; a numerous collection of coloured plates, mostly copies, with some that are original.

"General Zoology," London, 1800, et seq., several volumes 8vo, with plates, most of them copies.

"Zoology of New Holland," a few numbers, 8vo. London, 1794, et seq. The work remains unfinished.

Sloane (Hans), a former President of the Royal Society, born in 1660, died in 1753.

"Voyage to the Islands of Madeira, Barbadoes, Nevis, St Christopher and Jamaica," with 274 indifferent or bad plates, 2 vols folio. London, 1707, 1727.

Smeath.—**Smeathman** (Henry).

His History of the Termites, published in the seventy-first volume of the Philosophical Transactions, has been translated into French by Dr Rigaud of Montpellier, and inserted in the French translation of Sparrman's Voyage.

Smith (Hamilton), an officer in the English service and a learned naturalist.

Author of a great portion of the additions to the English translation of the Règne Animal, and particularly of the Synopsis Mammalium which terminates the third volume.

Soc. Nat. Berl., or **Berl. Mem.**, or **Nat. of Berl.**, or **Berl. Nat.**

The Memoirs of this Society have appeared successively under four different titles, in German.

1. "Beschæftigungen" (Occupations), 4 vols 8vo, 1775—1779.
2. "Schriften" (Writings), 11 vols 8vo, 1780—1794, the five last of which are also styled "Beobachtungen und Entdeckungen" (Observations and Discoveries).
3. "Neue Schriften" (New Writings), 4to, 1795—17 .
4. "Magazin," &c. (The Magazine of New Discoveries in Natural History), quarterly from 1807.

Sold.—**Soldani** (Ambrosio), General of the Camaldolites, subsequently Professsor at Siena, author of various works on Microscopic Testacea, both fossil and recent.

"Saggio Orithografico Ovvero Osservationi sopra le Terre Nautilitiche," &c., 1 vol. 4to. Siena, 1780.

"Testaceographia ac Zoophytographia Parva et Microscopica," 3 vols folio. Siena, 1789—1798.

SONNER.—SONNERAT, born at Lyons, died in Paris, 1814, an indefatigable collector.

"Voyage à la Nouvelle-Guinée," with one hundred and twenty plates, 4to. Paris, 1776. His first voyage.

"Voyage aux Indes Orientales et à la Chine," from 1774 to 1781, 2 vols 4to, with one hundred and forty plates. Paris, 1782. His second voyage.

SONNINI DE MANONCOURT (C. S.), engineer, born at Lorraine, died in Wallachia in 1814. I quote his

"Voyage dans la Haute et Basse Egypte," with an atlas of forty plates, 3 vols 8vo. Paris, 1799.

And sometimes his edition of Buffon, 8vo. Paris, Dufart, 1798.

SOWERB.—SOWERBY (James), and **SOWERBY** (G. B.), his son, English naturalists and artists.

"The Genera of Recent and Fossil Shells," thirty numbers, 8vo.

"Fossil Conchology."

Various papers in the Zoological Journal.

SPALL.—SPALLANZANI (Lazzaro), the celebrated observer, Professor at Reggio, then at Modena, and finally at Pavia, born in 1729, died in 1799. Of his numerous works we have only had occasion to quote the

"Opuscoli di Fisica Animale e Vegetabile," 1776.

They have been translated into French by Sennebier, 3 vols 8vo. Geneva, 1787.

SPARM.—SPARMANN (Andrew), born in 1748, a pupil of Linnæus. He visited the Cape of Good Hope and China, and was subsequently a Professor at Upsal.

VOY.

"Voyage au Cap de Bonne-Espérance," a French translation, 3 vols 8vo. Paris, 1787.

MUS. CARLS.

"Museum Carlsonianum," four small folio numbers. Stock., 1786, et seq. It contains figures of Birds, of which certain varieties are converted into species.

SPENCE.—SPENCE (William), an English naturalist.

"A Monograph of the Cholevæ" that are found in England, published in the Transactions of the Linnean Society.

SPENGL.—SPENGLER (L.), Curator of the cabinet of the King of Denmark, born in 1720.

Quoted for certain Memoirs in the Naturforscher, &c.

Spin.—Spinola (Maximilian), a Genoese noble, and a learned naturalist.

"Insectorum Liguriæ Species Novæ aut Rariores," with plates, 2 vols 4to. Genuæ, 1806—1808.

"Mémoire sur les Poissons de Ligurie;" one on the "Cératine Albilabre;" and the "Essai d'une Nouvelle Classification Générale des Diplolépaires," in the Annales du Muséum.

Spix (John), a naturalist of Bavaria and member of the Academy of Munich.

Quoted for his Memoirs in the Annales du Muséum, and for his great works on the Zoology of Brazil, where he travelled with M. de Martius by order of the King of Bavaria.

"The Natural Hist. of New Species of Monkeys and Bats" (in Lat. and Fr.), 1 vol. folio. Munich, 1823.

"New Species of Birds" (in Latin), with one hundred and nine coloured plates, 1 vol. 4to. Munich, 1824.

"New Species of Tortoises and Frogs" (in Latin), 4to. Munich, 1824.

"Nat. Hist. of New Species of Serpents," from the notes of the traveller, by John Wagler (Latin and French), 4to. Munich, 1824.

"Selected Genera and Species of Fishes," described by L. Agassiez, 4to. Munich, 1829.

Slab.—Slabber (M.), a Dutch naturalist.

"Natural Amusements, containing Microscopical Observations," &c. (in Dutch), 1 vol. 4to. Harlem, 1778.

He is also the author of certain Memoirs, published among those of the Academy of Harlem.

Stat. Mull. See article immediately preceding **Muller**, page 472.

Stev.—Steven (C.), Director of the Imperial Botanical Garden of Odessa.

"Description of certain Insects of Caucasus and of Southern Russia," a Memorial in 4to, printed among those of the Imperial Society of Naturalists of Moscow, Vol. II.

Stock. Mem.

"Memoirs of the Academy of Sciences of Sweden," of which 1 vol. 8vo (in the Swedish language) has annually appeared since the year 1739. The first forty reach to 1779. Since 1780 they have been published under the title of the "New Memoirs," &c.

Stoll.—Stoll (Casper), a Dutch physician.

Supplement to the work entitled "Les Papillons Exotiques des trois parties du Monde" (in Dutch and French), 1 vol. 4to. Amsterdam, 1790, et seq.

"Représentation exactement coloriée d'apres Nature, des Spectres, des Mantes, des Santerelles," &c. (in Dutch and French), 8 Nos 4to. Amsterdam, 1790, et seq.

"Représentation exactement coloriée d'apres Nature des Cigales et des Punaises" (in Dutch and French), 10 Nos 4to. Amsterdam, 1780 et seq.

Storr (T. C. C.), Professor at Tubingen.

His thesis entitled "Prodromus Methodi Mammalium," Tub., 1780, and republished in the "Delectus Opusculorum ad Sc. Nat. Spect. de Ludwig," 1 vol. 8vo, Leipzic, 1790, has been of great use to us.

Straus.—Straus Durckheim (H.).

"Considérations Générales sur l'Anatomie Comparée des Animaux Articulès, auxquelles on a joint l'Anatomie Descriptive du Hanneton," with plates, 1 vol. 4to. Paris, 1828.

The only work that can be compared to that of Lyonnet already mentioned.

He has read to the Acad. des Sciences, a "Mémoire sur le Systeme tègumentaire et musculaire de l'Araignée aviculaire," Mygale of Le Blond, Lat.

Stroem (John), a pastor in Norway, born in 1726.

Author of several Memoirs inserted among those of Drontheim, Copenhagen, &c. and of a description of the district of Sondmer.

Sturm (J.), a German naturalist and painter.

"Deutschland Fauna," with excellent plates, 2 vols 8vo. Nuremberg, 1807.

Sulz.—Sulzer (J. H.).

"Die Kennzeichen der Insecten," with plates, 1 vol. 4to. Zurich, 1761.

Surrir.—Surriray, a physician at Havre.

"Observations sur le fœtus d'une espèce de Calige," in the third volume of the Annales Générales des Sciences Physiques.

Swains.—Swainson, an English naturalist.

Author of various papers on Birds, published in the Linnean Transactions and in the Zoological Journal; also of

"Zoological Illustrations," a work which forms a sequel to the Zoological Miscellany of Leach, and to the Naturalist's Miscellany of Shaw.

In conjunction with Dr Horsefield he has published a Memoir on the Birds of New Holland, in the Linnean Transactions.

Swammerdam (John), a Dutch physician, born at Amsterdam in 1637, died in 1680.

"Biblia Naturæ," 1 vol. folio (Latin and Dutch). Leyden, 1737, 1738. The principal writer on the Anatomy of Insects.

Swed.—Sweder (N. S), a Swedish naturalist.

Author of a Memoir published among those of Stockholm, 1784.

Temm., and sometimes **T.—Temminck** (C. J.), formerly Director of the Society of Sciences of Haarlem, and proprietor of a valuable zoological collection, and now Director of the Royal Museum of Leyden.

"Histoire Naturelle Générale des Pigeons et des Gallinacés," 3 vols 8vo. Amsterdam and Paris, 1813, 1815.

The part containing the Pigeons has also been published in folio, with splendid coloured plates, by Madame Knip.

"Manuel d'Ornithologie ou Tableau Systématique des Oiseaux qui se trouvent en Europe," 1 vol. 8vo. Amsterdam and Paris, 1815.

"Monographies de Mammalogie," 4to. Paris, 1827.

"Planches Coloriées," 4to and folio, forming a sequel to the Planches Enluminées of Buffon. This work was published by Temminck jointly with M. Meiffren de Laugier, Baron, &c. &c.

Thien., or Thienem.—Thieneman, Professor and Curator of the Museum of Dresden.

Author of Observations (in German) on the Animals of the North and chiefly on the Phocæ, 8vo, with an atlas in 4to.

Thier.—Thiery de Menonville (N. J.), a French physician who visited Mexico for the purpose of carrying off the Cochineal.

"Traité de la culture du Nopal et de l'Education de la Cochinelle," 2 vols 8vo, with plates. Paris, 1787.

Thomas (P.), a physician of Montpellier.

"Mémoires pour servir a l'Histoire Naturelle des Sang-sues," pamphlet, 8vo. Paris, 1806.

Thompson (John W.), a surgeon of the English army.

"A Memoir on the Pentacrinus Europæus," 4to. Cork, 1827.

Thomps.—Thompson (William), an English physician established at Naples.

Author of a Memoir on a Hippurites which he calls Cornucopia.

Thunb.—Thunberg (C. P.), a pupil of Linnæus, who visited the Cape of Good Hope and Japan, Professor at Upsal, born in 1743.

Quoted for various Memoirs published among those of the Academy of Stockholm.

Tiedeman (Frederick), Professor at Heidelberg.

"Anatomy of the Holothuria, Asterias, and Echinus," folio, Landshut, 1805; one of our most splendid Monographs of Invertebrated animals.

Tiles.—Tilesius (W. G.), a German naturalist who sailed round the world.

Author of several Memoirs presented to the Academy of St Petersburg, of observations on various new animals in the Voyage of Krusensterm, and previously of an "Annual of Natural History," in the German, 12mo. Leipzic, 1802.

Trans. Lin. See **Linn. Trans.**

Treits.—**Treitschke** (Frederick), a German naturalist.

The continuer of Ochsenheimer's work on the Lepidoptera of Europe. The last volume (1829) contains the Pyralides.

Trembl.—**Trembley** (Abraham), a native of Geneva, born in 1710 and died in 1784; immortalized by his discovery of the reproductive power of the Polypus.

"Mémoires pour servir à l'Histoire des Polypes d'eau douce à bras en forme de cornes," with fifteen plates, 4to. Leyden, 1774.

Treutl.—**Treutler** (F. A.), a German physician, author of a thesis entitled

"Observationes Pathologico-anatomicæ Auctarium ad Helminthologiam Humani Corporis Continentes," 4to. Leipzic, 1793.

Trevir.—**Treviranus** (G. R.), Professor at Bremen.

"On the Internal Organization of the Arachnides" (in German), with plates, 4to. Nuremberg, 1812.

Tuckey (J. K.), a Captain of the British Navy.

"Relation d'une Expedition pour reconnaitre le Zaire," the French translation, with an atlas in 4to, 2 vols 8vo. Paris, 1818.

Vahl (Martin), a celebrated Danish botanist.

Author of certain Memoirs on Zoology published among those of the Society of Natural History of Copenhagen.

Vaill., or **Le Vaill.**—**Levaillant** (François), a celebrated traveller and collector, born at Surinam. His father was a Frenchman.

Voy. I.

"Voyage dans l'interieur de l'Afrique par le Cap de Bonne-Esperance," 2 vols 8vo. Paris, 1790.

Voy. II.

"Seconde Voyage dans l'interieur de l'Afrique," &c., 1 vol. 8vo. Paris, 1795.

Afr.

"Histoire Naturelle des Oiseaux d'Afrique," 5 vols 4to. Paris, 1799, et seq.

Perr.

"Histoire Naturelle des Perroquets," 2 vols 4to, and folio. Paris, 1801.

Ois de Par.

"Histoire Naturelle des Oiseaux de Paradis et des Rolliers, suivie de celle des Toucans et des Barbas," 2 vols folio. Paris, 1806.

"Histoire Naturelle des Promerops et des Guepiers," folio. Paris, 1807.

VAL.—VALENCIENNES (A.), Adjunct Naturalist to the Museum of Paris, and my fellow labourer in the great work on Fishes.

Author of various Memoirs published among those of the Museum, of the Annales des Sciences Naturelles, and of the Zoological Observations of M. de Humboldt.

VALENTYN (F.), a pastor at Amboyna.

"The East Indies, Ancient and Modern" (in Dutch), 5 vols folio. Dordrecht and Amsterdam, 1724—1726.

The third volume contains numerous observations on the Natural History of Amboyna. The plates of the Fishes are identical with those of Renard.

VALL.—VALLOT, Professor at Dijon,

Has presented to the Académie des Sciences a Memoir on certain species of Cecidomyiæ, and has also published in the thirteenth volume of the Annales des Sc. Nat. some observations on the habits of the Anthribus marmoratus, but which were made in Sweden by Dalman.

VANDELLI, an Italian naturalist, Director of the Museum at Lisbon.

"Author of certain Memoirs on the Fishes of the river Amazon, published among those of the Academy of Lisbon.

VANDER LIN.—VANDER LINDEN (P. L.), a physician and Professor of Natural History at Brussels,

Has published, in two Memoirs 4to, a description of the Libellulæ of the territory of Bologna, and also in 1 vol. 8vo, that of all the species of the same family peculiar to Europe.

Also observations on European Hymenoptera of the family of the Fossores.

The first number of a work entitled "Essai sur les Insectes de Java et des Isles Voisines;" a notice of the impression of an Insect enclosed in a piece of schistous limestone from Solenhofen in Bavaria. These three last Memoirs are published in the General Annals of the Physical Sciences. Brussels, 1819, et seq.

VAUCHER (J. P. the Reverend), Professor at Geneva.

"Histoire des Conferves d'eau douce," 1 vol. 4to. Geneva, 1803.

Author of some observations on Zoophytes, published in the Bulletin des Sciences.

VIEILL.—VIEILLOT (L. P.), a naturalist of Paris, died 1828.

"Histoire Naturelle des plus beaux Oiseaux Chanteurs de la zone torride," 1 vol. folio. Paris, 1805.

"Histoire Naturelle des Oiseaux de l' Amerique Septentrionale," of which but 2 vols folio have appeared. Paris, 1807.

He also continued the "Oiseaux Dorées" of Audibert, and has given us an "Analyse d'une nouvelle Ornithologie Elémentaire," pamphlet 8vo. Paris, 1816.

"Galerie des Oiseaux," which is quoted as Vieill. Gal. He assisted in publishing the edition of Buffon's "Birds," printed by Dufart, and the "Nouveau Dictionnaire d'Histoire Naturelle," by Deterville.

VIGORS, an English naturalist and principal editor of the Zoological Journal.

Author of various papers in the Linnean Transactions," &c.

VILL.—VILLERS (Charles de), a naturalist of Lyons.

"C. Linnæi Entomologia," 4 vols 8vo, with tolerably good plates. Lugduni, 1789.

A useful compilation at the time when it was published, and to which the author has added a description of various Insects peculiar to the southern departments of France.

VILL.—VILLIERS (Adrian P. de)

Has published in the Annales de la Sociéte Linneenne de Paris, Nov. 1826, a description of three undescribed or but little known Lepidoptera of the south of France, with a plate in which they are figured. He there also rectifies the description previously given of the "Bombyx Milhauseri."

VIQ D'AZ.—VIQ D'AZYR (Felix), born at Valogne in 1748, died at Paris in 1794; member of the Acad. des Sciences, and perpetual Secretary to the Societé Royale de Médecine. I quote his

"Système Anatomique," which forms a portion of the Encyclopédie Méthodique, and of which only the second volume appeared, containing the Quadrumana and the Rodentia, 1 vol. 4to. Paris, 1795.

VIREY (J. J.), a physician and one of the editors of the "Journal de Pharmacie et des Sciences accessoires," in which he has published his

"Histoire Naturelle des Vegetaux et des Insectes qui les produisent," as well as "Recherches sur l'Insecte de la Gomme-laque."

VIV.—VIVIANI (Domenico), Professor of Botany and Natural History at Genoa.

"Phosphorescentia maris quatuordecim lucescentium Animalculorum, Novis Speciebus illustrata," 1 vol. 4to. Genuæ, 1805.

VOSM.—VOSMAER (Arnold), a Dutch naturalist who died in 1799; he was Curator of the Museum and Menagerie of the Stadtholder.

Author of numerous Monographs (in Dutch and French) of various animals, with coloured plates, from 1767.

VOY. DE DUPER.

The Zoological part of the "Voyage de la Coquille," under M. Duperrey. This portion of the work is by Messrs Lesson and Garnot.

VOY. DE FREYCIN., OR ZOOL. DE FREYCIN.

The Zoological portion of the "Voyage de l'Uranie," under M. de Freycinet. It is by Messrs QUOY and GAIMARD.

WAGLER (John), a German naturalist, author of Ornithological fragments entitled

"Systema Avium," editor of the History of Serpents in the Brazilian Zoology of Spix and Martius, and author of Memoirs on Fishes in the Isis.

WALB.—WALBAUM (J. J.), a physician of Lubeck, born 1724,

Besides his edition of "Artedi," has given us (in German) a "Chelonographia," or Description of certain Tortoises, 1 vol. 4to. Lubeck and Leipzic, 1782.

Also some Memoirs inserted amongst those of the Naturalists of Berlin.

WALCH (J. E. E.), Professor at Jena, born in 1725 and died in 1778.

Author of the text of Knorr's "Monuments," &c. See Knorr.

WALCK.—WALCKENAER (C. A.), member of the Académie des Inscriptions et Belles-Lettres.

"Faune Parisienne," 2 vols 8vo. Paris, 1802.

"Tableau des Araneides," in numbers, like those of Panzer on the Insects of Germany. But five have appeared.

"Araneides de France," a work which forms part of that entitled "La Faune Française," published by MM. de Blainville, Desmarest, Vieillot, &c.

"Mémoires pour servir à l'Histoire Naturelle des Abeilles Solitaires," 1 vol. 8vo. Paris, 1817.

WEB.—WEBER (Frederick), a German naturalist, Professor at Kiel.

"Observationes Entomologicæ," 1 vol. 8vo. Kiel, 1801.

WHITE, BOT. B., or WHITE VOY.—WHITE (John), a surgeon in the English service at Botany-Bay.

"Journal of a Voyage to New South Wales," with sixty-five plates, *1 vol. 4to.* London, 1790. The Zoological part of this work, which is enriched with splendid drawings, appears to have been from the pen of John Hunter, the celebrated anatomist. There is a French edition, 1 vol. 8vo, Paris, 1795, in which useless notes are added to the original work, and the natural history and plates are suppressed.

WIEDEM.—WIEDEMANN.—WILLUGHBY DE ERESBY (Francis), born in 1635, and died in 1672, an English nobleman and a zealous naturalist.

"Ornithologiæ, lib. III," 1 vol. folio, London, 1676; published by Ray from his posthumous papers. It was translated by Salerne with additions, in 1 vol. 4to. Paris, 1767.

"Historia Piscium, lib. IV," 2 vols folio. Oxford, 1685.

The plates of these two works are mostly copied from other authors.

WILS.—WILSON (Alexander), an American naturalist, born in 1776, and died in 1813.

"American Ornithology," with coloured plates, 9 vols 4to. Philadelphia, 1808—1814.

A new edition, 3 vols 4to, appeared in 1828.

WOLFF (J. F.), a German naturalist.

"Icones Cimicum Descriptionibus Illustratæ," 4 Nos 4to. Erlangæ, 1804.

WOLFF, joint author with **MEYER** of the "Almanack of German Birds."

Worm. or Mus. Worm.—**Wormius, or Worm. Olaus**, Professor at Copenhagen, born in 1588, died in 1654.

"Museum Wormianum," 1 vol. folio. Leyden, 1650.

Yarr.—**Yarrell**, an English naturalist, author of various papers in the Zoological Journal of London, &c.

Zed.—**Zeder** (J. G. H.), a German naturalist.

"Author of "First Supplement to the Natural History of Intestinal Worms by Goeze," 1 vol. 4to. Leipzic, 1800.

"An Introduction to the Natural History of the Intestinal Worms," 1 vol. 8vo. Bamberg, 1803.

Zetterst.—**Zettersted** (J. G.), a Swedish naturalist.

"Orthoptera Sueciæ," 1 vol. 8vo. Lundæ, 1811.

"Fauna Laponica," part first, 1 vol. 8vo. Hammone, 1828.

Zool. Journ.

Published in London by M. Vigors, aided by Messrs Th. Bell, E. T. Bennet, J. E. Bicheno, J. G. Children, Gen. T. H. Hardwicke, Dr. Horsefield, W. Kirby, the Messrs Sowerby, father and son, and W. Yarrell. We have sixteen numbers, from 18 to 1829.

Zorgdr.—**Zorgdrager**, a Dutchman.

Author of a treatise on the whale fishery.

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FINIS.

ERRATA.

VOL. I.

Page 71, for "Nocthorus," read "Nocthora."
238, for "Morpnus," read "Morphnus."
277, for "*Mæura,*" read "*Mænura.*"
263, (note) for "*Merremic,*" read "*Merrem, &c.,*"
235, second line, for "*Cuneiform,*" read "*gradate.*"

VOL. II.

116, for "*Or the Mailed cheeks,*" read "*This family, or the,*" &c.
159, for "Carauxomorus," read "Caranxomorus."
198, for "Ciprinidæ," read "Cyprinidæ."
206, for "Lebras," read "Lebias."
228, for "Plabucus," read "Piabucus."
290, for "Sqatina," read "Squatina."
371, for "*Navettes Volvæ,*" read "*Navettes* (*Volva.*)"
386, for "Stromatia," read "Stomatia."
406, for "Anodontea," read "Anodonta."

VOL. III.

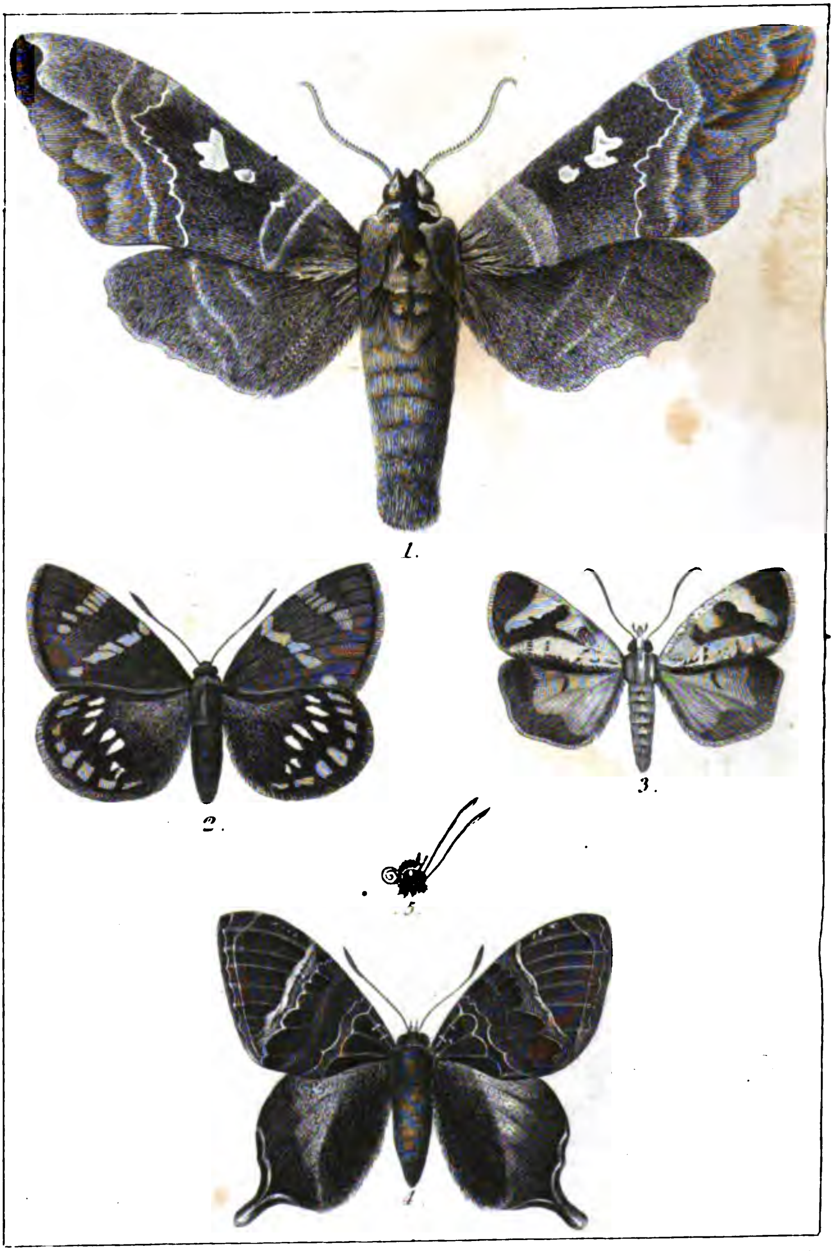
75, for "Sysmata," read "Lysmata."
564, for "Languira," read "Languria."
343, (note) for "*S. Lecontei,*" read "*C. Lecontei.*"

VOL. IV.

102, for "*In the second tribe,*" read "*In the third tribe,*" &c.
141, for "Cleonitis," read "Celonites."
380, for "*Taniræ,*" read "*Janiræ.*"

EMENDATIO.

In Vol. II, page 446, and wherever the word occurs, for "Annelides," read "Annulata," and consequently, for "Tubicolæ, Dorsibranchiatæ," &c. read "Tubicola, Dorsibranchiata," &c. &c.

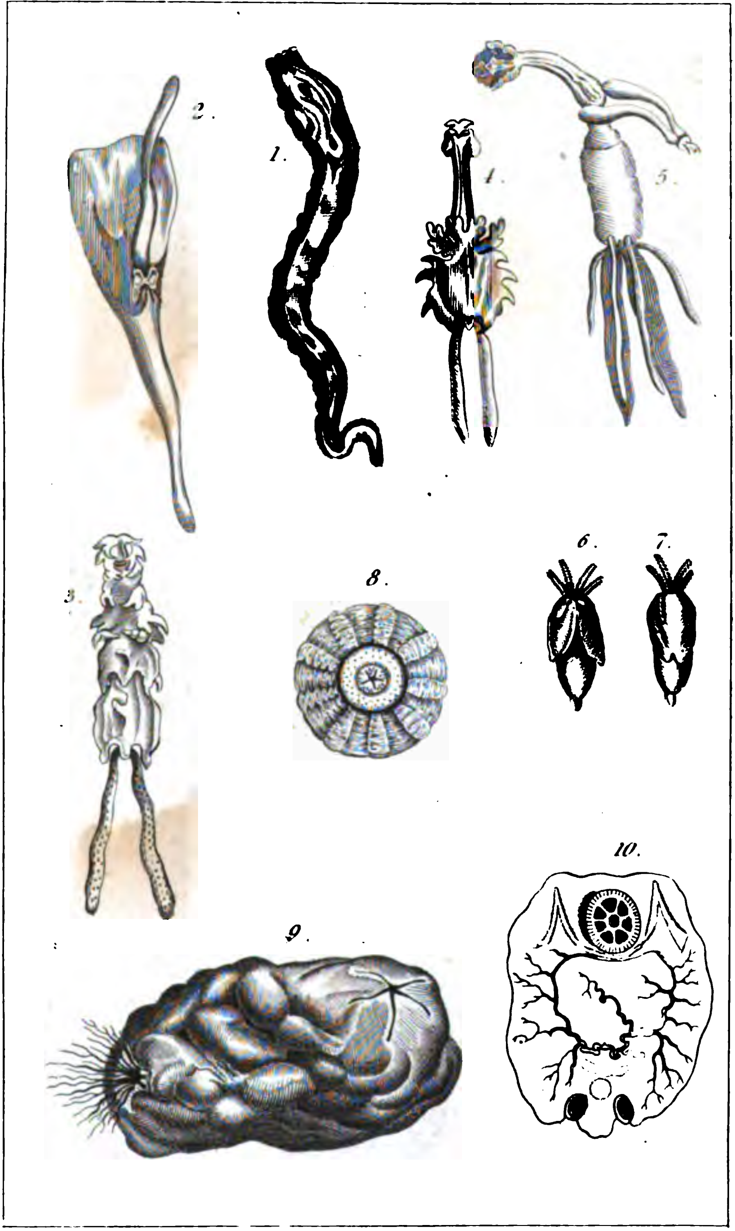


Lauvillard del.   Tucker Sc.

1. Smerinthus Dumolinii. 2. Castnia Hubneri.

3. Ægocera Boisduvalii. 4. Coronis Durvillii &

5. its head in profile.

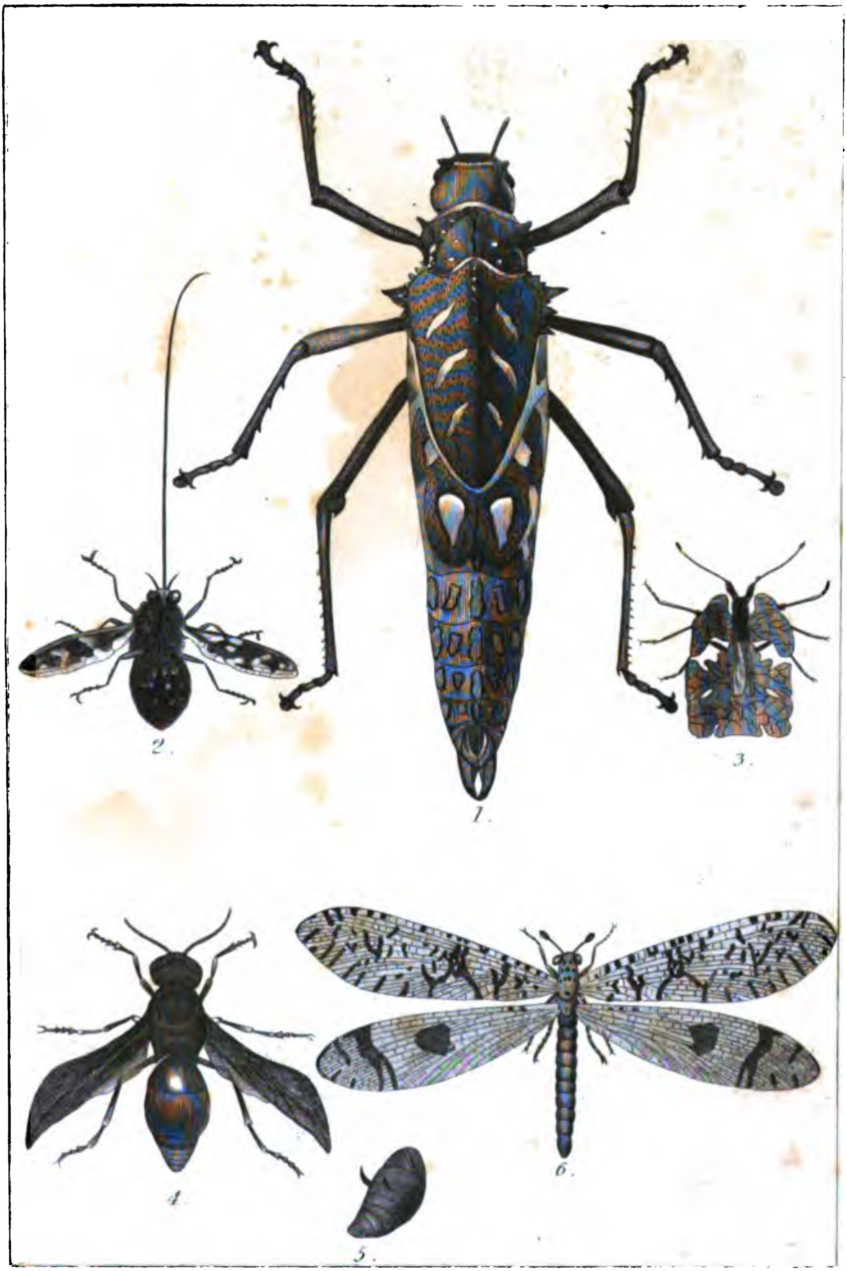


Laurillard del. [illegible] Sc.

1. 2. Floriceps saccatus. C. 3. 4. 5. Various Chondracanthi

6. 7. Tetrarhynchus lingualis. 8. Mynias cyanea

9. Holothuria Cuvieria. 10. Tristoma coccineum



Laurillard del. Tudor Sc.

1. *Pneumora scutellaris.* 2. *Nemestrina longirostris.*
3. *Coreus phyllomorphus* 4. *Synagris spiniventer &*
5. *its abdomen.* 6. *Myrmeleon clavicorne.*